NP-2020/2120

SERVICE MANUAL (for 220/240V)

REVISION 2 DEC. 1992

Canon
FY8-13AM-020

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I. FEATURES

1. Front-loading.

- The copier is designed to accept cassettes from the front for ease of use (two cassettes holding 250 sheets each).
- The copier is given two cassette holders, thereby eliminating the need for cassette replacement in making copies of different sizes.
- The copier's multifeeder allows you to feed multiple postcards (NP2120)

2. Full line of auto mechanisms.

- The copier has an auto paper selection mechanism as standard, which selects paper of the correct size in response to placement of a document.
- With the auto reproduction ratio selection mechanism, the copier calculates the correct reproduction ratio according to the specified copy size.
- The AE (auto exposure) mechanism ensures crisp reproduction of newspapers and blue-print documents.
- The copier's auto-start feature lest you press the COPY START key during the wait period so that the copier will start making copies as soon as it becomes ready (NP2120).

3. HQ jumping toner.

- The copier uses Canon's own HQ (high quality) jumping toner for reproduction of clear characters and photos.
- The toner is of a single-component type, which provides stable images.
- In addition, a 30-dia. high sensitivity OPC drum is used to enable enhanced image reproduction and a compact copier design.

4. Man-machine interface.

- As many as 21 copies (A4, landscape) may be made per minute.
- The zoom mechanism allows reduction down to 50% and enlargement up to 200% of the original image.
- The page separation mode serves to speed up copying book-form documents.
- The copier accepts documents as small as a postcard or as large as A3.
- With the CT unit (option), the copies may be in red, green, blue, or brown.

5. A variety of options to choose from for full automation.

The copier communicates with its options at a higher speed than ever, resulting in more output per giventime*.

* With options, up to 21 copies/min; 1:1 (A4, landscape).

- ADF-A1 for automatic document feed.
- Sorter-A1 for automatic sorting and grouping (20 bins).
- MS-A1 for automatic sorting and grouping (10bins).
- Control Card V (configured as built-in) for copy volume control (up to 200 depts.).
- Stapler Sorter 10-B1 for stapling copies sorted in its ten bins.

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II. SPECIFICATIONS

A. Type

Body	Desk top
Copyboard	Fixed
Light source	Halogen lamp 100/115V model ... 300W 220/240V model ... 330W
Lens	Zoom lens
Photosensitive medium	OPC

B. Construction

Copying		Indirect static photocopying
Charging		Corona
Exposure		Slit (moving light source)
Copy density adjustment		Automatic (AE) or manual
Development		Dry
Pick-up	Automatic	2 cassettes; multifeeder (NP2120)
	Manual	Manual feed tray (NP2020)
Transfer		Corona
Separation		Curvature and Static eliminator
Cleaning		Blade
Fixing		Heat roller (900 W)

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C. Performance

Document type			Sheet, Book, 3-D object (2 kg/4.4 lb max.)
Document size (max.)			A3 (297X420 mm)/LDG (11"X17")
Reproduction ratio			See Table 1-1; 50% to 200%, zoom.
Wait time			90 sec or less (20°C/68°F)
First copy			9 sec or less
Continuous copying			1 to 99 copies
Copy size			A3/LDG (297 × 431.8 mm) max. (11 in × 17 in) Postcard (100 × 148 mm) min. (3.9 in × 5.8 in)
Copy paper	Cassette		Plain paper (64 to 80 g/m²), Tracing paper (SM1), Colored paper
	Manual feed tray		Plain paper (64 to 128 g/m²), Tracing paper (SM1, GNT80*), Colored paper, OHP film, Postcard, Label * *NP2020 only.*
		Tow-sided Overlay copy	Plain paper (64 to 128 g/m²), Colored paper, OHP film (overlay only), Postcard
Cassette			Claws, Front loading; 250 sheets (approx.) of 80 g/m²
Copy tray			99 sheets (80 g/m²)
Non-image width			2.0 mm/0.08 in (leading edge), 2.5 mm/0.1 in (left/right)
Auto clear mechanism			Provided. (2 min, standard; may be disabled)
Auto shut-off mechanism			Not provided.
Auto start			NP2120 only.
Option			Sorter-A1, MS-A1, Paper Deck Pedestal, Control Card V, CT Unit, Stapler Sorter-B1, Stapler Sorter-B2

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D. Others

		NP2120	NP2020
Operating environment	Temperature	7.5°C to 30°C (45.5°F to 86°F)	
	Humidity	10% to 80%	
	Atmospheric pressure	0.6 to 1 atm.	
Power source		Serial No.	
	220V/50 Hz		DXJXXXXX, DZYXXXXX, DZZXXXXX, PABXXXXX
	240V/50 Hz	RRNXXXXX	QADXXXXX, QAEXXXXX
	240V/50 Hz		FXJXXXXX, RAFXXXXX, PAGXXXXX, RAHXXXXX
	220V/50 Hz	PRNXXXXX	UAJXXXXX, UAKXXXXX, UAZXXXXX
Power consumption	Max.	1.5 kW	
	During copying	0.804kWH (reference only)	
	At standby	0.156kWH (reference only)	
Noise	During copying	50 dB or less (1 m from copier)	
	At standby	40 dB or less (1 m from copier)	
Ozone (average over 8 hrs.)		0.1 ppm or less	
Dimensions	Width	725 mm (28.5 in)	660 mm (26.0 in)
	Depth	617 mm (24.3 in)	
	Height	538 mm (21.2 in)	
Weight		60.5 kg (133.4 lb)	
Consumables	Copy paper	Keep wrapped to protect against humidity.	
	Toner	Avoid direct sun, and keep under 40°C/104°F, 85%.	
	CT unit	Keep in box or pedestal; avoid direct sun, and keep it under 30°C/86°F, 85%.	

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	DIRECT	REDUCE	ENLARGE
100/220/240 V	1 : 1 (±0.5%)	1 : 0.500 (±1.0%) 1 : 0.700 (±1.0%) 1 : 0.816 (±1.0%) 1 : 0.865 (±1.0%)	1 : 1.154 (±1.0%) 1 : 1.224 (±1.0%) 1 : 1.414 (±1.0%) 1 : 2.000 (±1.0%)
115V	1 : 1 (±0.5%)	1 : 0.500 (±1.0%) 1 : 0.647 (±1.0%) 1 : 0.773 (±1.0%) 1 : 0.786 (±1.0%)	1 : 1.214 (±1.0%) 1 : 1.294 (±1.0%) 1 : 2.000 (±1.0%)
220/240 V	1 : 1 (±0.5%)	1 : 0.500 (±1.0%) 1 : 0.707 (±1.0%)	1 : 1.414 (±1.0%) 1 : 2.000 (±1.0%)

Table 1-1 Fixed Reproduction Ratio

Reproduction ratio		Copy size	No. of copies/min
DIRECT	1 : 1 (±0.5%)	A3 A4 A4R B4 B5 B5R Ledger Legal Letter Letter R	11 21 16 13 21 17 11 13 20 16
REDUCE	1 : 0.647	Ledger → Letter R	15
	1 : 0.707	A3 → A4 R B4 → B5R	14 17
	1 : 0.773	Ledger → Legal	13
	1 : 0.786	Legal → Letter R	16
	1 : 0.816	B4 → A4R	15
	1 : 0.865	A3 → B4 A4 → B5	13 18
ENLARGE	1 : 1.414	A4R → A3 B5R → B4	11 13
	1 : 1.294	Letter → Ledger	11
	1 : 1.224	A4RI → B4	13
	1 : 1.214	Legal → Ledger	11
	1 : 1.154	B4 → A3 B5 → A4	11 18

Table 1-2 Copy Speed

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Papaer size	Dimensions	
	(mm)	(in)
A3	297 × 420	11.7 × 16.5
A4	210 × 297	8 .3 × 11.7
A5	148.5 × 210	11.7 × 16.5
B4	357 × 364	10.1 × 14.3
B5	182 × 257	7.2 × 10.1
B6	128.5 × 182	5.1 × 7.2
Ledger (11" × 17")	279.4 × 431.8	11 × 17
Legal	216 × 356	8.5 × 14
Letter	216 × 279	8.5 × 11
Mini (STMT)	139.5 × 216	5.5 × 8.5
Korean Legal	190 × 265	7.5 × 10.4
Folio	210 × 330	8.3 × 13
Foolscap	216 × 330	8.5 × 13
Australian Foolscap	206 × 337	8.1 × 13.3
Argentine Legal	220 × 340	8.7 × 13.4
Argentine Letter	220 × 280	8.7 × 11.0
U.S. Government Legal	203 × 330	8 × 13
U.S. Government Letter	203 × 267	8 × 10.5
Officio	216 × 317	8.5 × 12.5
Argentine Officio	220 × 340	8.7 × 13.4
Ecuadoran Officio	220 × 320	8.7 × 12.6
Bolivian Officio	216 × 355	8.5 × 14.0

Table 1-3 Paper Size

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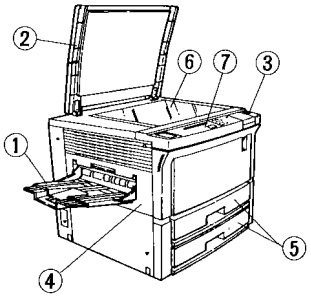
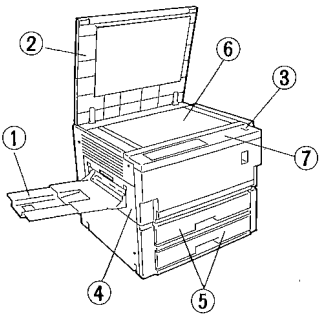
III. NAMES OF PARTS

A. External View



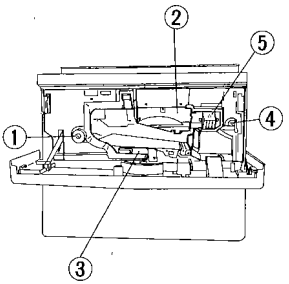
NP2020



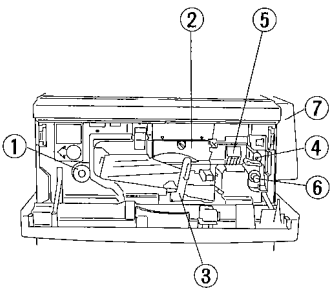
NP2120

① Copy tray
② Copyboard cover
③ POWER switch
④ Delivery unit cover
⑤ Cassette
⑥ Copyboard glass
⑦ Control panel

Figure 1-1



NP2020



NP2120

① Fixing assembly knob
② Drum unit
③ Delivery unit release lever
④ Developing assembly release lever
⑤ Developing assembly
⑥ Registration knob (NP2120)
⑦ Multifeeder (NP2120)

Figure 1-2

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B. Cross-Sectional View

1. NP2020

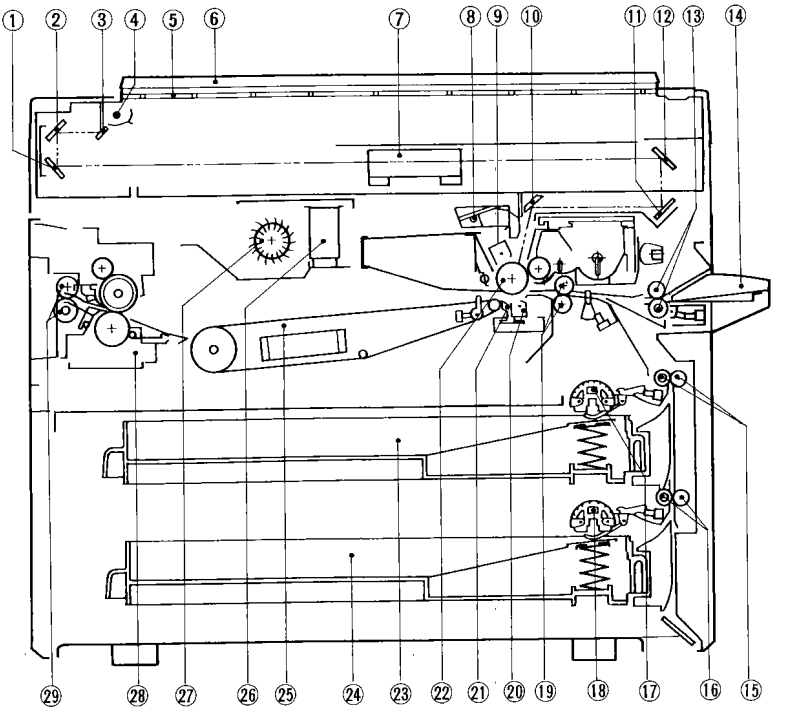

Figure 1-3

① No. 3 mirror
② No. 2 mirror
③ No. 1 mirror
④ Scanning lamp
⑤ Copyboard glass
⑥ Copyboard cover
⑦ Lens
⑧ Pre-exposure lamp
⑨ Primary corona unit
⑩ No. 6 mirror
⑪ No. 5 mirror
⑫ No. 4 mirror
⑬ Manual feed pick-up roller
⑭ Manual feed tray
⑮ Vertical feed roller 1
⑯ Vertical feed roller 2
⑰ Cassette 1 pick-up roller
⑱ Cassette 2 pick-up roller
⑲ Registration roller
⑳ Transfer corona unit
㉑ Static eliminator
㉒ Photosensitive drum
㉓ Cassette 1
㉔ Cassette 2
㉕ Feeder unit
㉖ Ozone filter
㉗ Exhaust fan
㉘ Fixing unit
㉙ Delivery roller

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2. NP2120

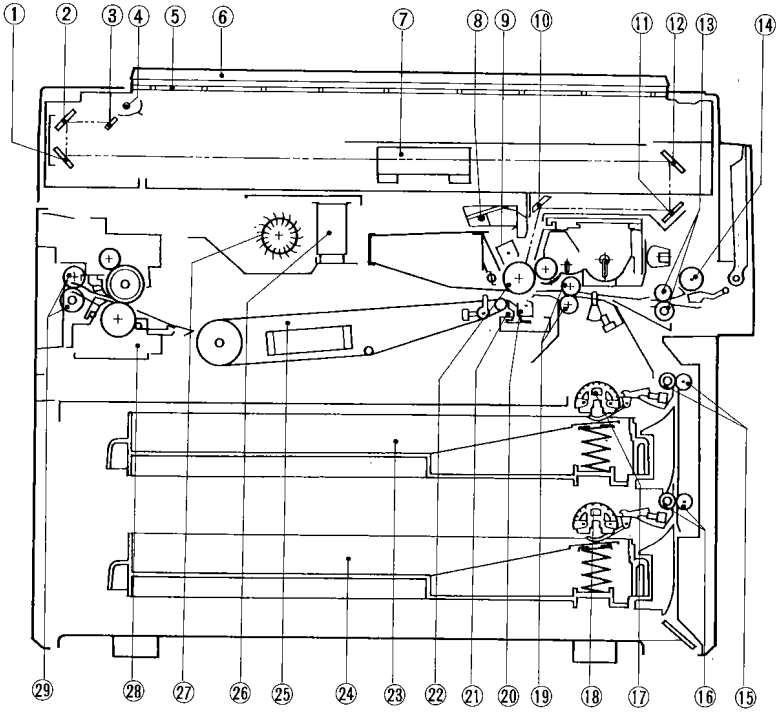

Figure 1-3 a

① No. 3 mirror
② No. 2 mirror
③ No. 1 mirror
④ Scanning lamp
⑤ Copyboard glass
⑥ Copyboard cover
⑦ Lens
⑧ Pre-exposure lamp
⑨ Primary corona unit
⑩ No. 6 mirror
⑪ No. 5 mirror
⑫ No. 4 mirror
⑬ Manual feed roller
⑭ Manual feed pick-up roller
⑮ Vertical feed roller 1
⑯ Vertical feed roller 2
⑰ Cassette 1 pick-up roller
⑱ Cassette 2 pick-up roller
⑲ Registration roller
⑳ Transfer corona unit
㉑ Static eliminator
㉒ Photosensitive drum
㉓ Cassette 1
㉔ Cassette 2
㉕ Feeder unit
㉖ Ozone filter
㉗ Exhaust fan
㉘ Fixing unit
㉙ Delivery roller

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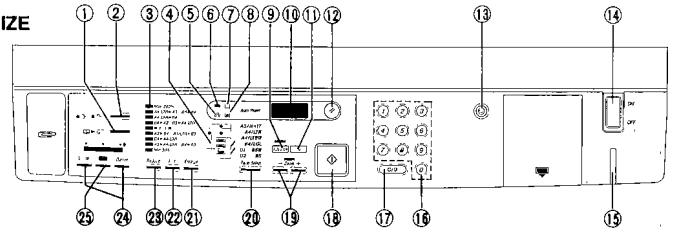
IV. OPERATION

A. Control Panel

1. NP2020

A/B/INCH SIZE



A SIZE

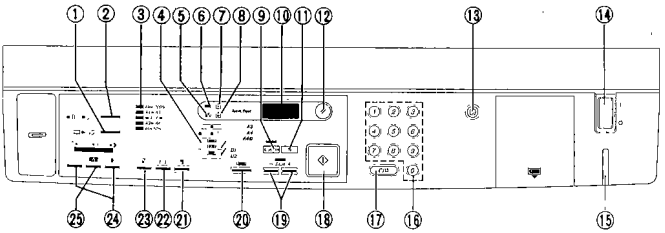


Figure 1-4

① PAGE SEPARATION key
Press the key to select the page separation mode.

② SORT/GROUP key
Press the key to select the SORT/GROUP/NON-SORT mode; when the indicator is OFF, the non-sort mode is selected.

③ FIXED RATIO indicator

④ JAM location indicator

⑤ JAM indicator

⑥ CONTROL CARD indicator

⑦ ADD TONER indicator

⑧ ADD PAPER indicator

⑨ AUTO RATIO key
Press the key to select the auto reproduction mode; effective only when an ADF is attached.

⑩ COPY COUNT indicator
- A press on the % key indicates the reproduction ratio (%).
- The count decreases for each copy made.

⑪ % key
Hold down the key to check the reproduction ratio shown on the COPY COUNT indicator; the indication goes OFF 2 sec after the key is released.

⑫ RESET key
Press the key to return to the standard mode:
- Copy count 1
- Ratio ..... DIRECT
- Mode ..... NON-SORT
- AE ..... OFF

⑬ PRE-HEAT key
A press on the key in the standby mode activates the pre-heat mode.
- All LEDs except the PRE-HEAT indicator and POWER indicator will go OFF.
- The fixing temperature will be controlled at 140°C/284°F.

⑭ POWER switch

⑮ POWER indicator
The indicator remains ON when the POWER switch is ON.

⑯ TENKEY pad

⑰ CLEAR/STOP key

⑱ COPY START key
- If red, no copy can be made.
- If green, copies may be made.

⑲ ZOOM key
Press the key to select the desired reproduction ratio between 50% and 200% in 1% increment.

⑳ CASSETTE SELECT key

㉑ FIXED ENLARGEMENT key

㉒ DIRECT key

㉓ FIXED REDUCE key

㉔ COPY DENSITY key

㉕ AE key (automatic exposure control)

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2. NP2120

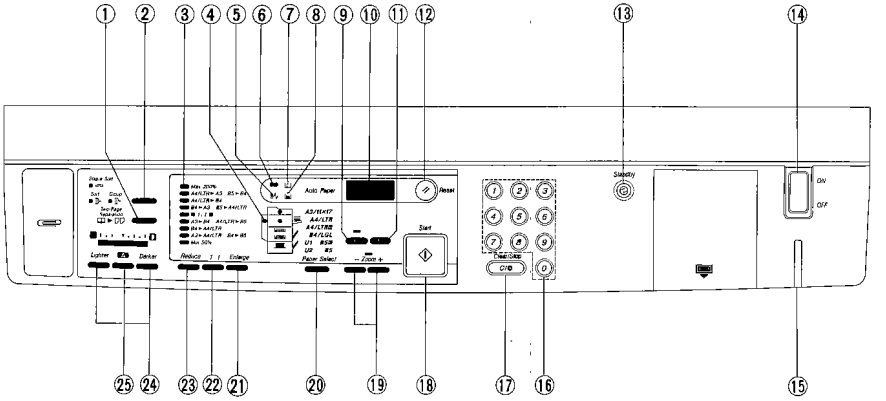

Figure 1-4a

① PAGE SEPARATION key
Press the key to select the page separation mode.

② SORT/GROUP/STAPLE SORT key
Press the key to select the sort, group, staple sort, or non-sort mode.
The copier is in the non-sort mode when the indicator is OFF.

③ FIXED RATIO indicator

④ JAM location indicator

⑤ JAM indicator

⑥ CONTROL CARD indicator

⑦ ADD TONER indicator

⑧ AUTO ZOOM key
Press the key to select the auto zoom feature.

⑩ COPY COUNT indicator
- indicates the ratio when the % key is pressed.
- incremented for each copy during copy operation.

⑪ % key
Hold down the key to change the COPY COUNT indicator notation from ratio to copy count.
Upon release, the notation is replaced by the copy count in 2 sec.

⑫ RESET key
Press the key to return to the standard mode: copy count 1, DIRECT, non-sort, AE (may be deactivated).

⑬ PREHEAT key
Press the key during the standby period to choose the preheat mode.
- All LEDs except the PREHEAT and POWER indicators on the control panel go OFF.

⑭ POWER switch

⑮ POWER indicator
The indicator remains ON when the POWER switch is ON.

⑯ TENKEY pad

⑰ CLEAR/STOP key

⑱ COPY START key
- when it flashes green, you cannot make copies.
- when it remains green, you can make copies.
- it remains red during copy operation.

⑲ ZOOM key
Press the key when selecting a reproduction ratio between 50% and 200% in 1% increments.

⑳ CASSETTE SELECT key

㉑ ENLARGE key

㉒ DIRECT key

㉓ REDUCE key

㉔ COPY DENSITY key

㉕ AE key (automatic density adjustment)

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B. Making Copies

1) Turn the POWER switch ON.
   ① If the temperature of the fixing assembly is below the specified value,
   - NP2020
     The COPY START key remains red.
   - NP2120
     The COPY START key flashes green.

   ② If the temperature of the fixing assembly is above the specified value, the COPY START key goes green.
   ③ The wait time is normally 90 sec (20°C, average).
2) Open the copyboard cover, and place a document face down aligning it with the size index.
3) Press the DIRECT, REDUCE, ENLARGE, or ZOOM key for the desired copy size.
4) Press the AE key, and press the COPY DENSITY key as necessary if manual adjustment is desired.
5) Check the size of the cassette.
   ① Replace the cassette if it does not contain paper of the desired size.
6) Press the TENKEY pad to set the desired number of copies (1 to 99), and check the COPY COUNT indicator.
   ① Press the CLEAR/STOP key to correct any mistake; set the copy count thereafter.
7) Press the COPY START key.
   ① If the CLEAR/STOP key is pressed in the continuous copy operation, the copier stops after it has completed the copy run.
   ② The adjustment mode for density may be switched from automatic to manual between when the operation is started and when the last copy is completed; however, switching from manual to automatic is not possible during the period.

Note:
If the copy is too dark or light in the AE mode, de- activate the AE mode, and make copies while varying the density using the COPY DENSITY key.

   ③ If the ADD PAPER indicator comes ON during copy operation and the operation stops, add paper to the cassette; a press on the COPY START key thereafter causes the copier to make the remaining number of copies.
   ④ If an ADF is attached to the copier, documents placed on the tray will be automatically picked up and copied when the COPY START key is pressed.
   ⑤ After each copy operation or a key operation, the copier returns to the standard mode if left alone for about 2 min*.

*Cannot be changed, but may be de-activated.

C. Using the Manual Feed Tray (NP2020)

1) Set a document on the copyboard.
2) Press the DIRECT, REDUCE, ENLARGE, or ZOOM key.
3) De-activate the AE mode, and adjust the density using the COPY DENSITY lever if manual adjustment is desired.
4) Feed a sheet of copy paper along the guides on the manual tray.
   ① The copier automatically starts copying as soon as it detects the copy paper.
   ② Make sure sheets are fed at intervals of 50 mm or more if in the continuous copy mode.

Note:
When the ADD PAPER indicator is ON, the COPY READY indicator is red; manual feed operation, however, is still possible.

D. Using the Manual Feed Tray (NP2120)

1) Set the document on the copyboard.
2) Open the manual feed tray.
3) Set the slide guide to suit the paper size.

Note:
Slide out the sub tray as necessary to suit larger paper sizes.

4) Insert as many sheets as necessary along the guide until they stop; keep the face of the copy paper up.

E. Making Two-Sided Copies

Make sure that the copy is oriented the same way (front and rear) for both first and second sides; keep the following in mind:

① Check the paper is not moist or curled;
② Check the paper is of 64 to 128 g/m^2;

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③ Do not process each side more than once; and
④ Do not use both overlay and two-sided copy modes on a single sheet of paper.

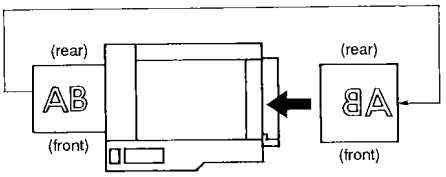


Figure 1-5

F. Making Overlay Copies

By replacing the developing assembly, the copy may carry two colors; keep the following in mind:

① Check the paper is of 64 to 128 g/m²;
② Do not process each side more than twice; and
③ Do not use both overlay and two-sided copy modes on a single sheet of paper.

G. Replacing the CT Unit

1) Open the front door.
2) Turn the developing assembly release lever counterclockwise.
3) Slide out the developing assembly to the front.
4) Hold the grip of the developing assembly, and lift the assembly slowly.

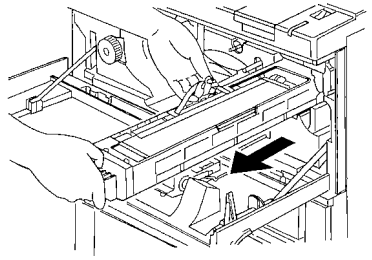


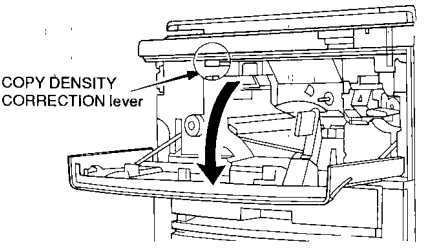
Figure 1-6

5) Place the CT unit on the developing assembly rail, and slide it in.
6) Turn the developing assembly lever clockwise.
7) Close the front door.

Note:
1. Do not tilt or shake the developing assembly or CT unit.
2. Do not place the developing assembly or CT unit on the floor; rather, keep them in storage boxes.

H. Using the COPY DENSITY CORRECTION Lever

If the copies are always dark or light, slide the lever to obtain the desired density.



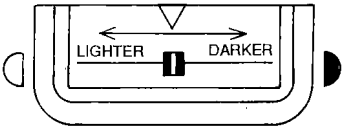


Figure 1-7 COPY DENSITY CORRECTION Lever

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I. Auto-Start (NP2120)

The START indicator goes and remains red when you press the COPY START key during warm-up, and copy operation starts as soon as warm-up is completed.

- You can press the COPY START key while the wire is being cleaned or during the jam wait period.
- You still have access to the DENSITY key, AE key, RESET key, or STOP key after activating the auto-start mode.
- To cancel the auto-start mode, press the RESET or CLEAR/STOP key.

Note:
The auto-start mode will automatically be canceled if the cassette has run out of paper, if the control card is not inserted, or if the right door of the cassette holder is open.

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V. WARNINGS AND ACTIONS TO TAKE

A. JAM Indicator (8↯)

If the indicator goes ON during copy operation, take the following steps; a jam is likely to have occurred at the location indicated.

For jams in any of the options (sorter or ADF), see the respective service manual.

NP2020

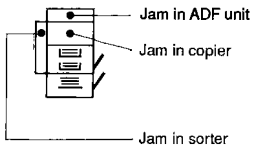

Figure 1-8

NP2120

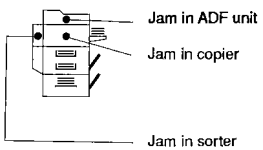

Figure 1-8 a

If the jam is in the copier, be sure to check the pick-up unit, separation unit/feeder unit, fixing assembly/ delivery unit, and drum unit to remove all paper found.

1) Open the front door.
2) Remove the copies from the copy tray.
3) Pull the grip of the delivery unit to open the delivery unit cover.
4) Check if paper is jammed in the fixing assembly; if paper is found, turn the fixing assembly knob clockwise to remove it.

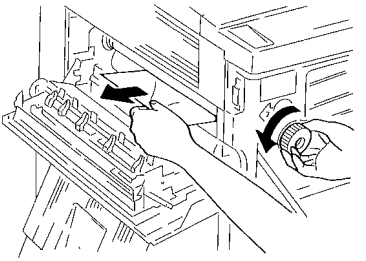

Figure 1-9

5) Close the delivery unit cover.
6) Check if paper is jammed in the separation unit/ feeder unit; if paper is found, turn the feeder unit release lever counterclockwise to release the feeder unit.
   Work with care.

Note:
When removing paper from the separation unit, take care not to touch the photosensitive drum.

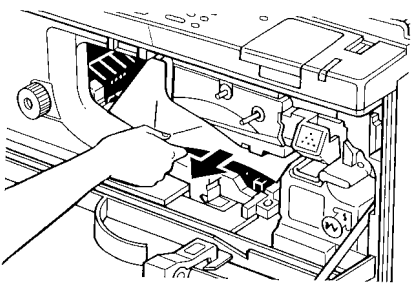

Figure 1-10

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7) Open the right cover, and check if paper is jammed; remove the paper, if any.
Further, check that no paper is sticking out of the cassette.

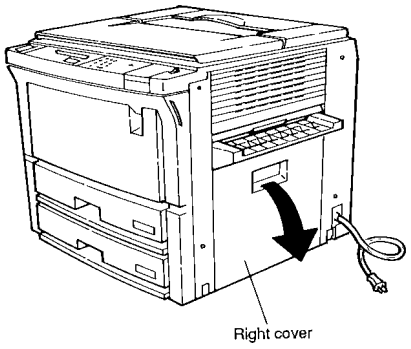

Figure 1-11

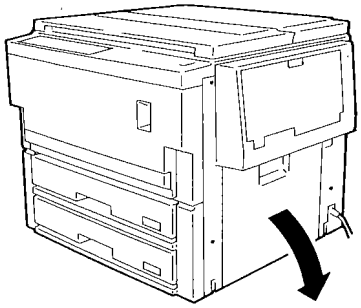

Figure 1-11a

8) Close the right door, and then the front door.

1. Using the Multifeeder Tray (NP2120)

Lift the lever, and pull out the jam, taking care not to tear the paper.

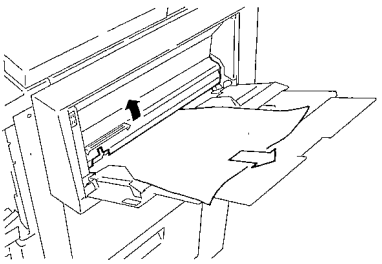

Figure 1-12a

B. ADD PAPER Indicator ( )

The indicator goes ON if no cassette is in the cassette holder or the cassette has no paper.

1) Slide out the cassette to the front of the copier.
2) Put paper in the cassette.
3) Slide the cassette back into the copier.

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C. ADD TONER Indicator ( )

The indicator goes ON when the black developing assembly is running out of toner.

1. Black Developing Assembly

1) Open the front door.
2) Turn the black developing assembly lever counterclockwise.
3) Pull the black developing assembly to the front until it stops.
4) Open the top lid of the black developing assembly.
5) Shake the toner cartridge side to side about ten times.
6) Place the toner cartridge on the black developing assembly.
7) Hold the toner cartridge, and pull the seal to the front until a resistance is felt.

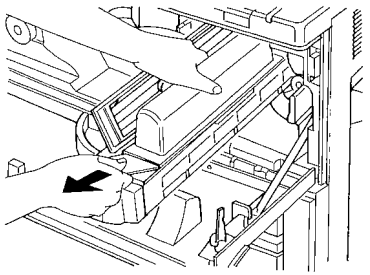


Figure 1-12

8) Tap the top of the toner cartridge so that all toner remaining in the cartridge falls into the developing assembly.
9) Detach the toner cartridge with care.
10) Close the top lid of the black developing assembly.
11) Slide the black developing assembly into the copier.
12) Turn the developing assembly release lever clockwise.
13) Close the front door.

2. CT Unit (mono color developing unit)

If the image seems too light in parts of a mono color copy, the CT unit is likely to be running out of mono color toner; replace the unit if this happens. If the CT unit is placed in the protection box and shaken, the problem may be corrected temporarily.

Note:
The CT unit is of a disposable type; do not add toner, but use a new unit.

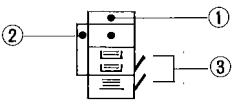
D. CONTROL CARD Indicator ( )

The indicator flashes in response to the following conditions while the control card is in the copier.

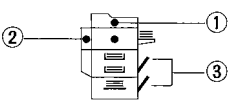
1 The control card is not properly inserted into the control card unit.
2 The control card unit indicates 'P' or 'EE' even when the control card is properly inserted into the control card unit.

E. Indicator

Any of the following goes ON if a document is left behind, the sorter is detached, or the right door is open.



NP2020



NP2120

① Document is left behind.
② Sorter is detached.
③ Right door is open.

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VI. ROUTINE WORK BY THE USER

Advise the user to clean the following once a week without fail:

1) Primary Corona Wire
   Slide in and out the cleaning wire to clean it.
2) Copyboard Glass
   Wipe it using a moist cloth; thereafter, wipe it using a dry cloth.
3) Copyboard Cover
   Wipe it using a mild detergent solution; thereafter, wipe it using a dry cloth.
4) Static Eliminator
   Clean the static eliminator using the cleaning brush (accessory).
   If separation jams occur frequently, clean the static eliminator using the cleaning brush (accessory) as necessary.

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I. IMAGE FORMATION PROCESS

A. Outline

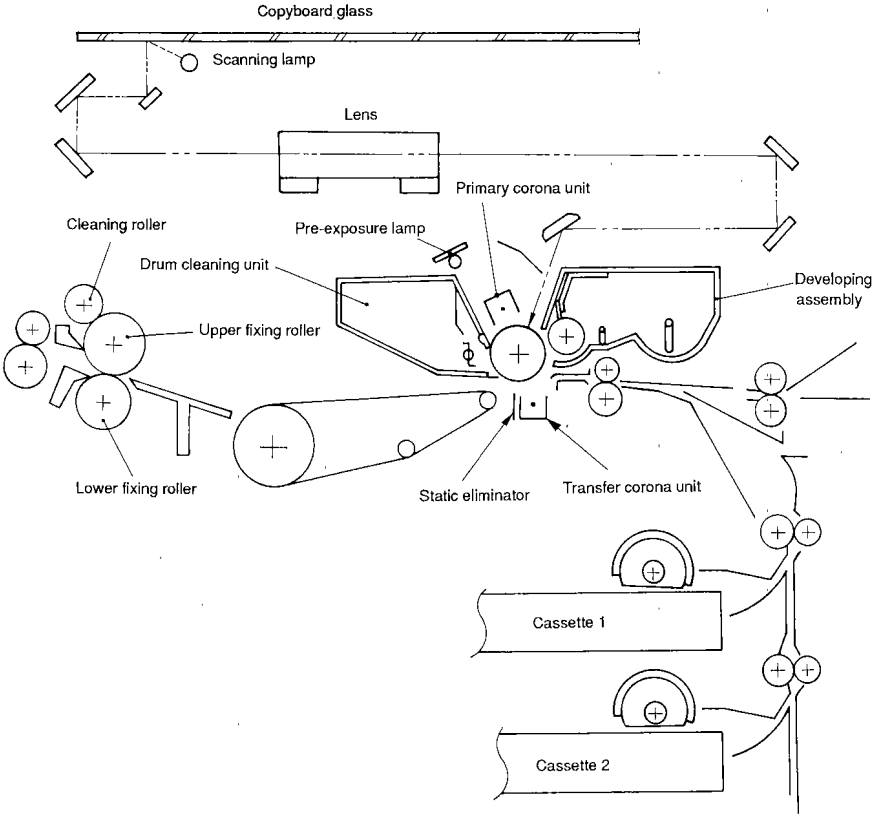

Figure 2-1

1. See Figure 2-1 for the construction of the copier. Images are formed in the following eight steps:

Step 1 Pre-conditioning exposure
Step 2 Primary corona exposure (negative DC)
Step 3 Image exposure
Step 4 Development (AC and negative DC)
Step 5 Transfer corona exposure (negative DC)
Step 6 Separation
Step 7 Fixing
Step 8 Drum cleaning

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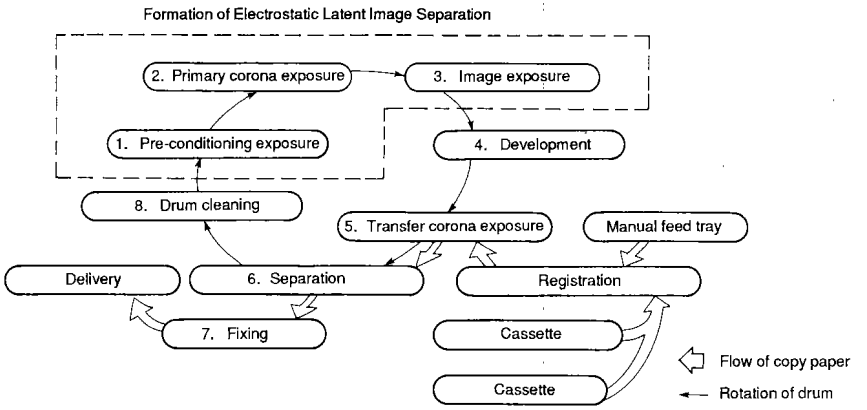

Figure 2-2

The photosensitive drum is of a two-layer construction; its outer layer is made of organic photoconductor (OPC), and the inner layer is an aluminum base made of conducting material.

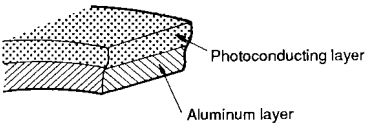

Figure 2-3

2. Formation of Electrostatic Latent Image

This block consists of the first three steps of the image formation process; at its end, the areas of the drum corresponding to dark areas of the document are left with negative charges, and those representing light areas are rid of negative charges.

The pattern of charges so formed is not visible to the human eye and, therefore, is called an electrostatic latent image.

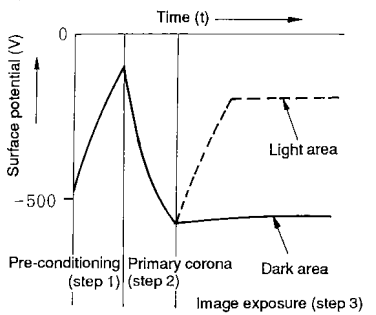

Figure 2-4

3. Step 1 Pre-conditioning exposure

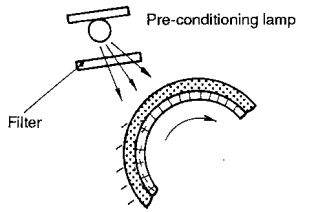

Figure 2-5

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In this step, or pre-conditioning exposure, the surface of the drum is exposed to light from the pre-conditioning exposure lamp. All charges remaining on the surface of the drum from the preceding copy cycle are eliminated in preparation for exposure by the primary corona. Such charges, if left as they are, could result in copies with uneven density.

4. Step 2 Primary corona exposure

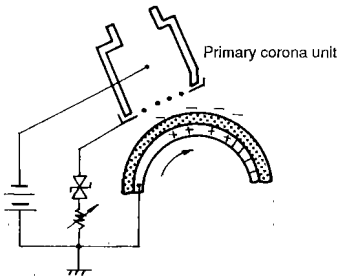

Figure 2-6

In this step, the drum is exposed by the primary corona. As a result, its surface will come to have a uniform layer of negative charges and maintain primary potential.

The surface potential of the drum is determined by the value of the grid bias, grounded by way of a constant voltage element.

5. Step 3 Image exposure

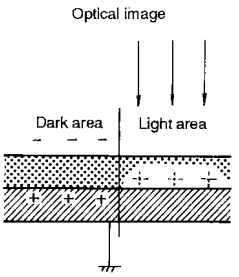

Figure 2-7

In this step, the optical image of the document is projected on the surface of the drum to neutralize the charges in light areas.

6. Step 4 Development

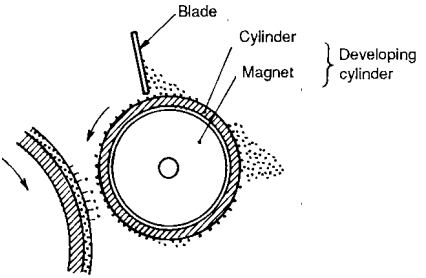

Figure 2-8

As shown in Figure 2-8, the developing assembly consists of a developing cylinder and a magnetic blade; the developing cylinder itself is made up of a magnet fixed in position and a cylinder which rotates around the magnet.

The black developer is a single-component developer of magnetite and resin. The developer has insulating properties and is charged to a positive potential by friction with the rotating cylinder.

The color developer is a fixed-ratio mixture of carrier (iron powder) and toner (resin).

By friction with the rotating cylinder, the iron powder is charged to a negative potential, and the toner to a positive potential.

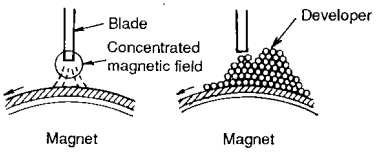

Figure 2-9

A concentrated magnetic field develops between the magnet and the tip of the blade, and the developer is attracted to the magnetic field.

The magnetic field holds the developer it has attracted virtually immobile and creates a collection of developer particles hanging from the tip of the blade. As the cylinder rotates, the developer particles leave the magnetic field to deposit themselves on the cylinder in a thin, uniform layer.

Since both the developing cylinder and blade are given AC bias and DC bias (negative component) at the same time, the resulting waveform of the developing bias has a larger negative component than positive.

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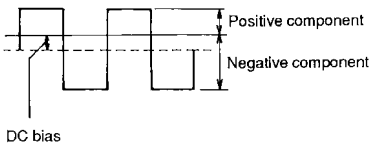

Figure 2-10

During copy operation, the toner is attracted to the drum by the work of the surface potential of the drum as well as the developing bias (at time of positive component), and it turns the electrostatic latent image to a visible image. The excess toner is repelled by the surface potential of the drum and the developing bias (at time of negative component).

A DC bias affects copy density; a larger bias, i.e., approaching 0V, increases the density but, at the same time, tends to cause fogging.

7. Step 5 Transfer

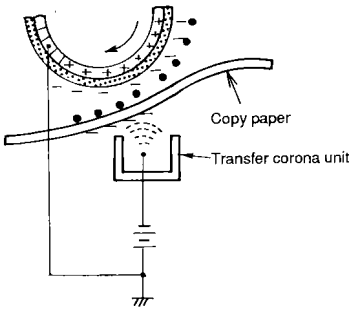

Figure 2-11

In this step, a negative corona is applied to the back of the copy paper so as to attract the positively charged toner to the paper.

8. Step 6 Separation

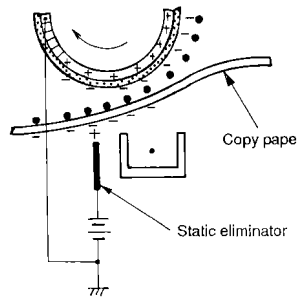

Figure 2-12

In this step, the paper is separated from the drum making use of the rigidity of the copy paper. Thin paper, with little rigidity, however, tends to remain in contact with the drum; to prevent such a condition, the static eliminator is charged to a positive potential to facilitate separation by weakening the static attraction between the drum and copy paper.

9. Step 7 Fixing

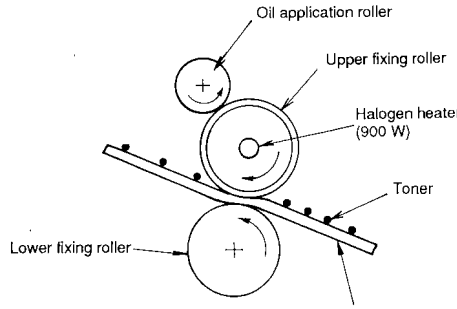

Figure 2-13

In this step, the paper carrying a transfer image moves between two heated rollers, and the transfer image is fixed to the paper.

To prevent jams and toner offset, the upper roller remains in contact with the oil application roller impregnated with silicone oil.

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10. Step 8 Drum cleaning

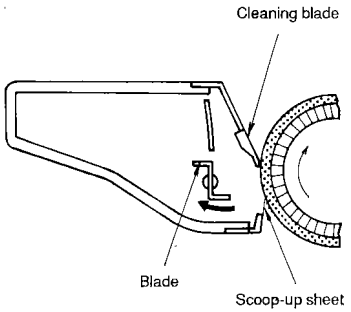

Figure 2-14

In this step, the toner remaining on the drum surface is scraped off by the cleaning blade and collected by the scoop-up sheet in preparation of the next copy cycle. The toner is then moved aside by the blade.

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II. AUXILIARY PROCESSES

A. Blank Exposure Mechanism

The blank exposure mechanism is used to remove the potential from the non-image sections of the drum in the REDUCTION mode or to suit paper sizes; see p. 3-37.

The light from the pre-exposure lamp is reflected by the reflecting plate and directed onto the photosensitive drum.

The non-image section between two sheets of copy paper is kept free of toner by lowering the grid bias of the primary corona unit, instead of using the blank exposure mechanism to remove the potential of the drum.

B. Ozone Filter

The fan unit is equipped with an ozone filter, which breaks down the ozone generated by the coronas into oxygen by catalytic action.

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I. BASIC MECHANISMS

A. Functional Construction

The copier can be divided into four functional blocks; pick-up/feed system, exposure system, image formation system, and control system.

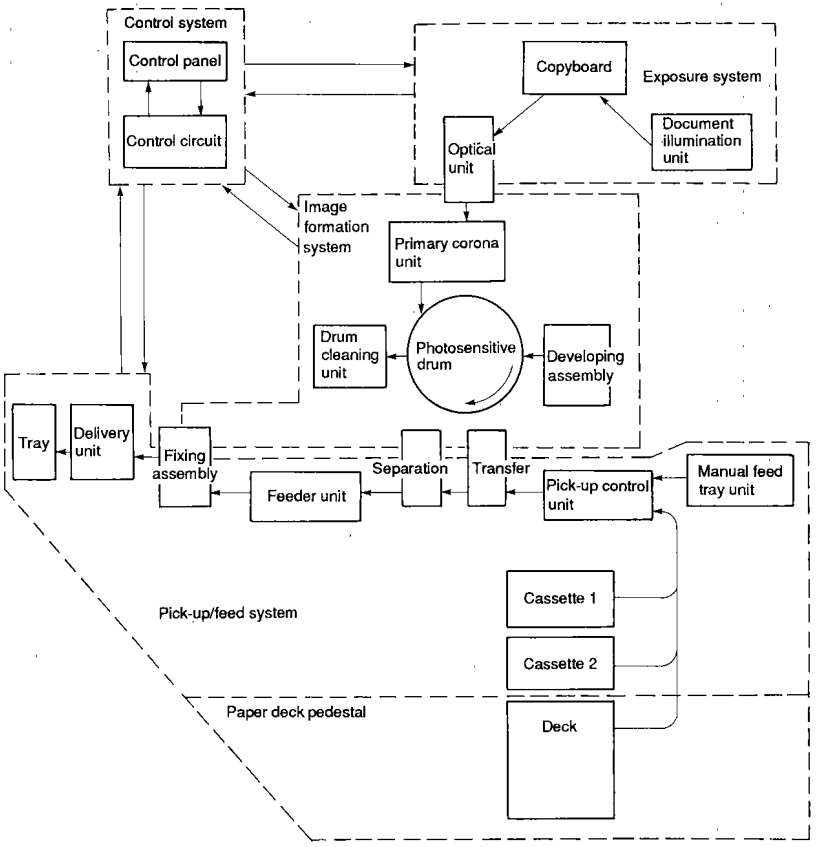

Figure 3-1

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B. Electrical Circuitry

The copier is controlled by the two microprocessors and communication LSI on the DC controller PCB, each of which functions as follows:

Microprocessors

Q301 (master)
- Controls the copy sequence.
- Controls the document size identification.

Q302 (slave)
- Controls the stepping motor.
- Outputs the image formation control signals.

LSI

Q304 (IPC)
- Controls the serial communication with ADF and sorter.

Note:
With the built-in A/D converter, the copier's microprocessors can read both digital and analog signals.

Note:
The main motor (M1) is a synchronous motor that uses the frequency of the power supply as reference. The scanner motor (M2) and lens motor (M3), on the other hand, are stepping motors that use the oscillation frequency of the crystal oscillator built in the DC controller. As such, luctuations in the power supply frequency during copy operation in turn fluctuate the main motor (M1), causing the copies to carry expanded or contracted images.

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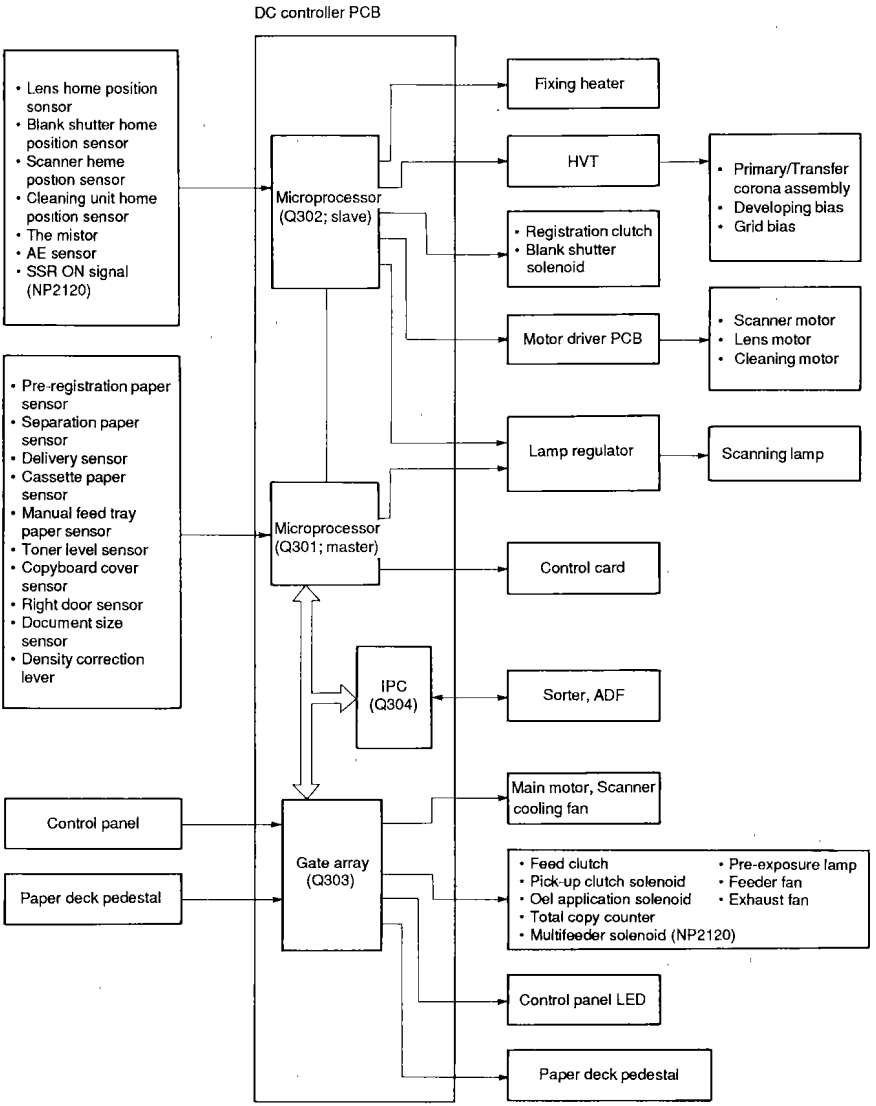

Figure 3-2

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C. Inputs to DC Controller

Inputs to DC Controller (1/4)

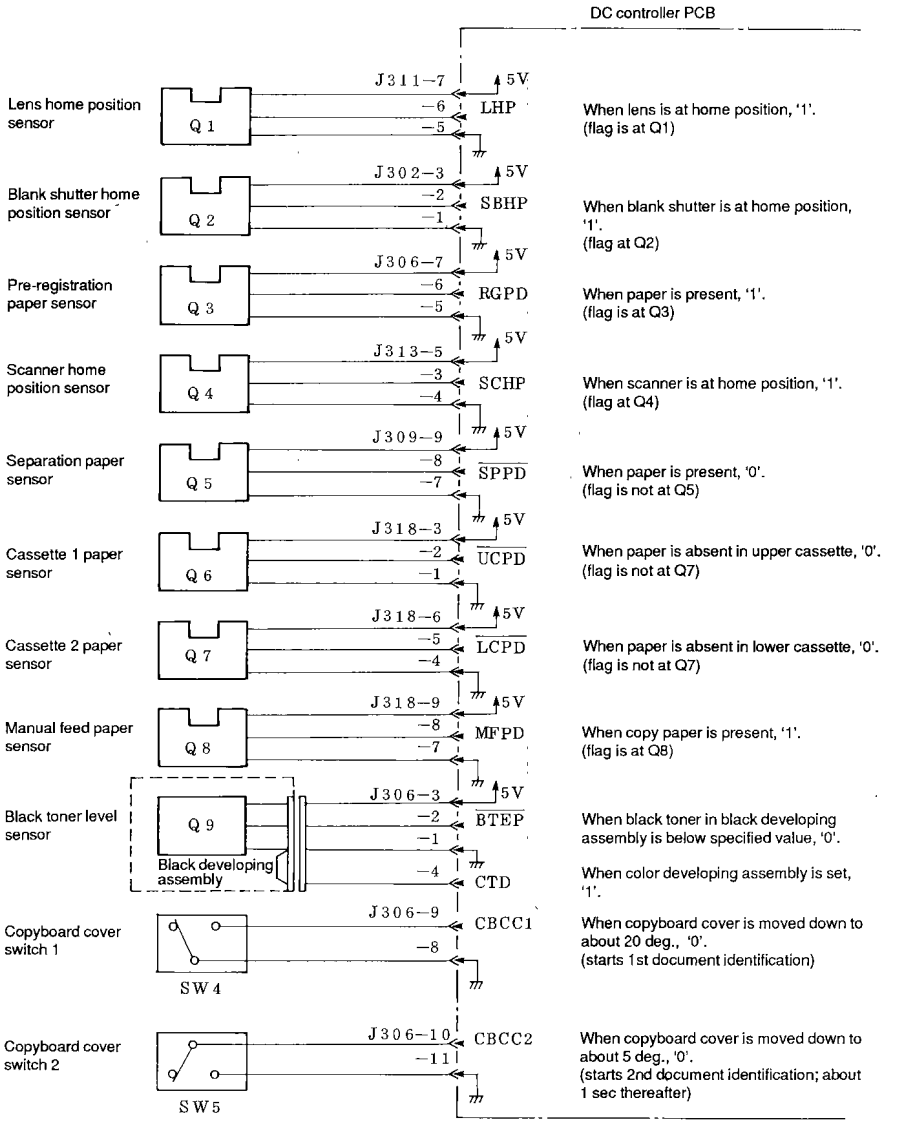

Figure 3-3

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Inputs to DC Controller (2/4)

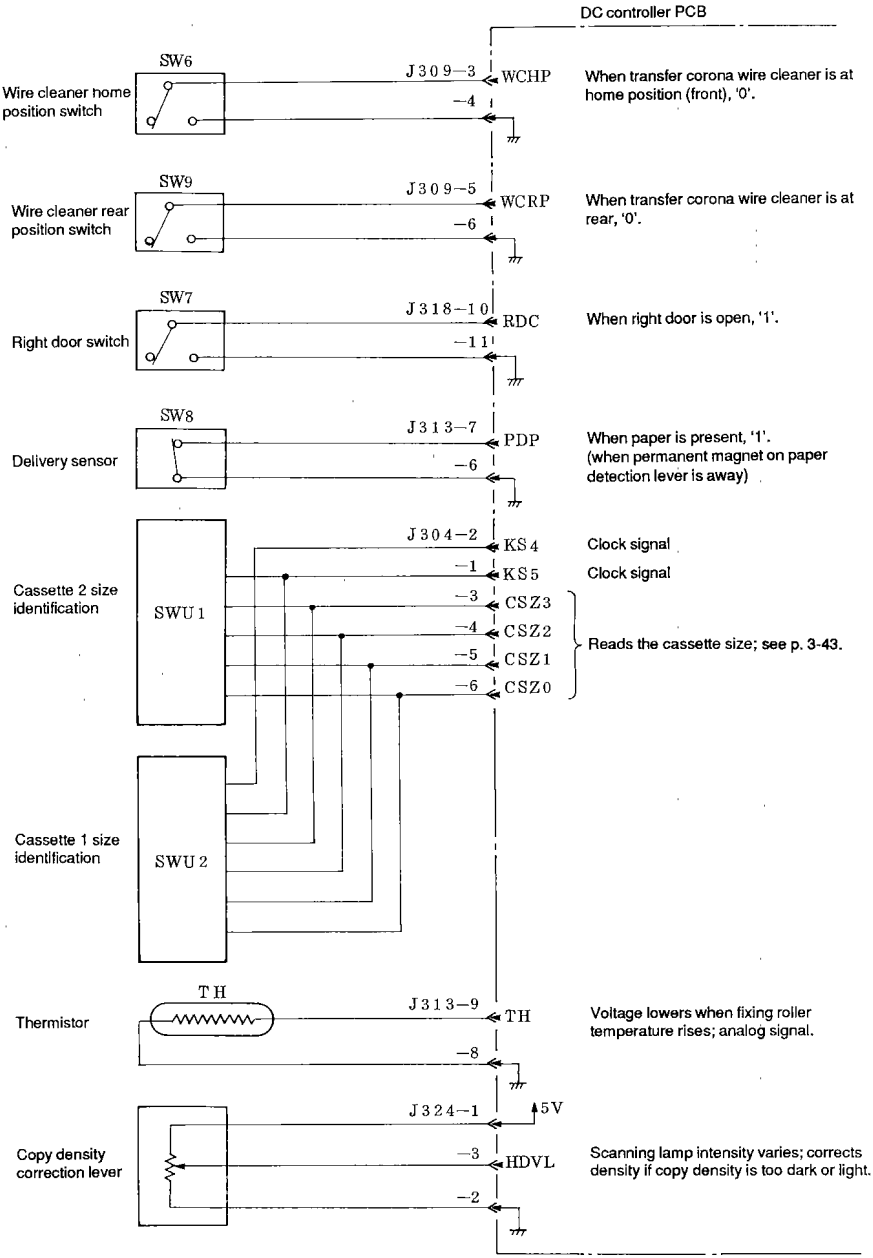

Figure 3-4

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Inputs to DC Controller (3/4)

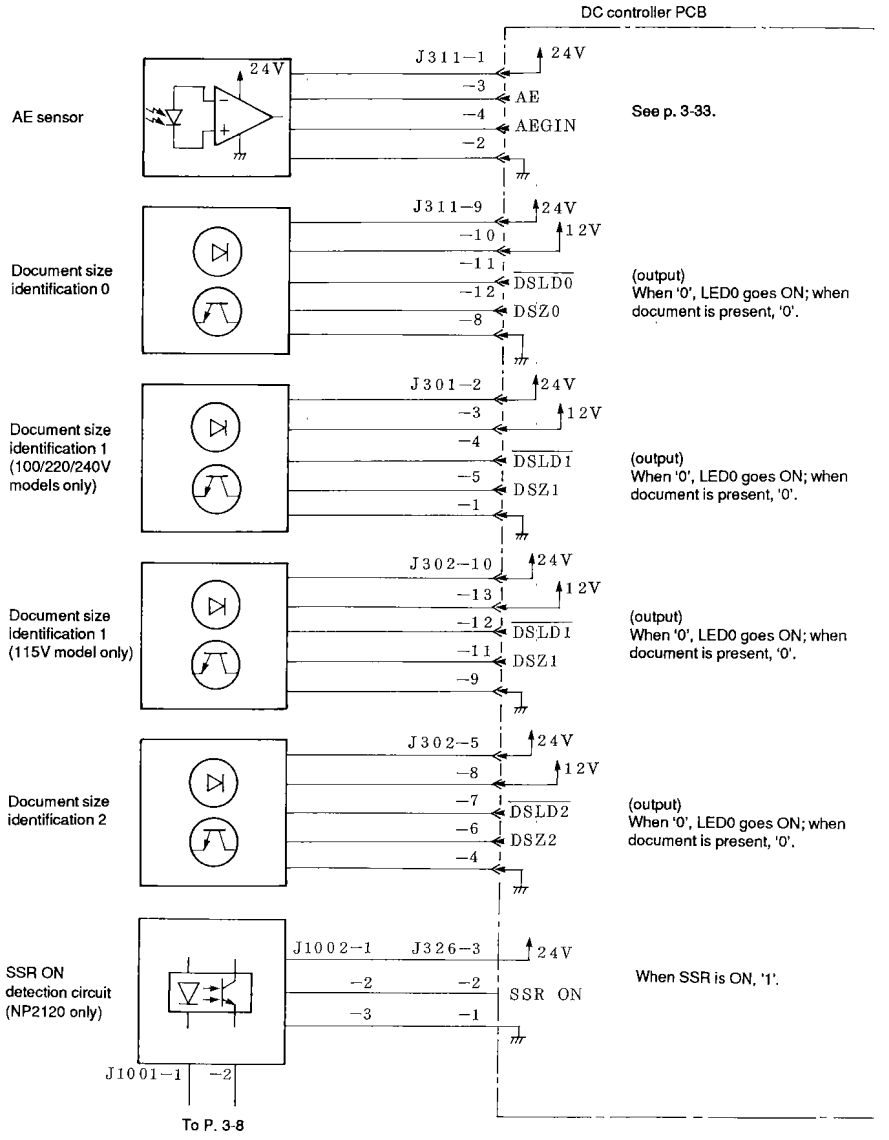

Figure 3-5

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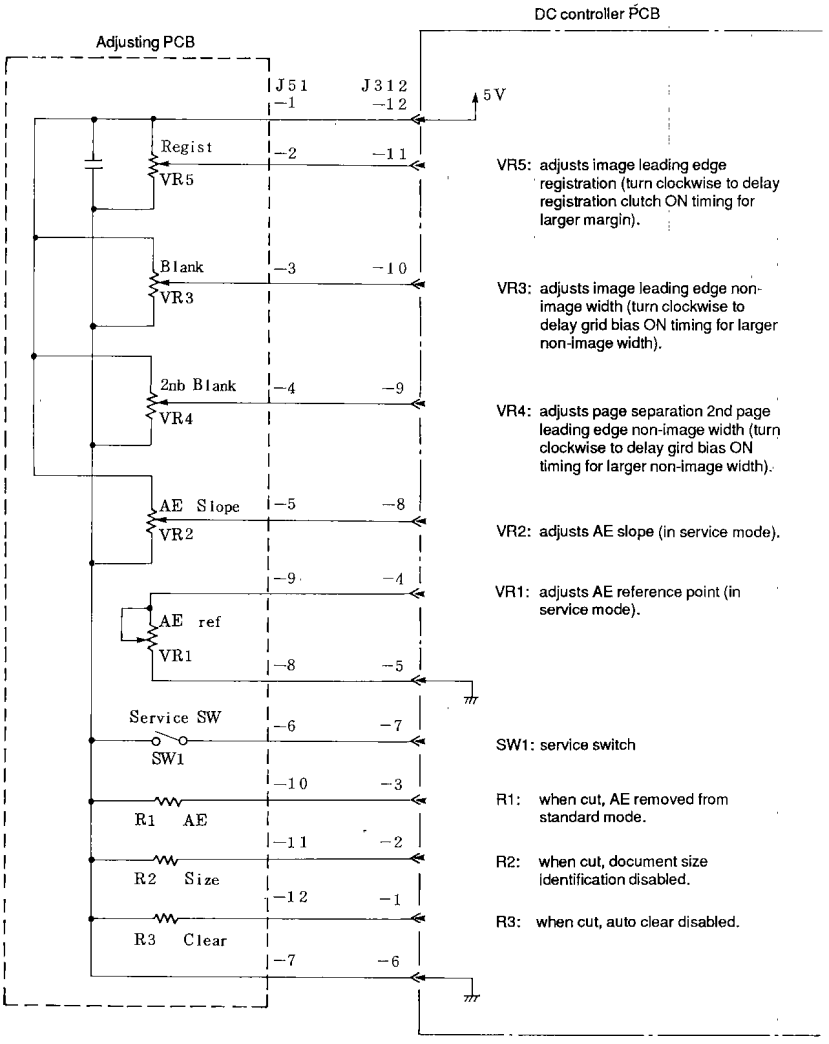
Inputs to DC Controller (4/4)


DC controller PCB
Adjusting PCB
J51
J312
5V
Regist
VR5
Blank
VR3
2nb Blank
VR4
AE Slope
VR2
AE ref
VR1
Service SW
SW1
R1 AE
R2 Size
R3 Clear
VR5: adjusts image leading edge registration (turn clockwise to delay registration clutch ON timing for larger margin).
VR3: adjusts image leading edge non-image width (turn clockwise to delay grid bias ON timing for larger non-image width).
VR4: adjusts page separation 2nd page leading edge non-image width (turn clockwise to delay gird bias ON timing for larger non-image width).
VR2: adjusts AE slope (in service mode).
VR1: adjusts AE reference point (in service mode).
SW1: service switch
R1: when cut, AE removed from standard mode.
R2: when cut, document size identification disabled.
R3: when cut, auto clear disabled.

For details on adjustment for each VR, see the SERVICE HANDBOOK.

Figure 3-6

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D. Outputs from DC Controller

Outputs from DC Controller (1/3)

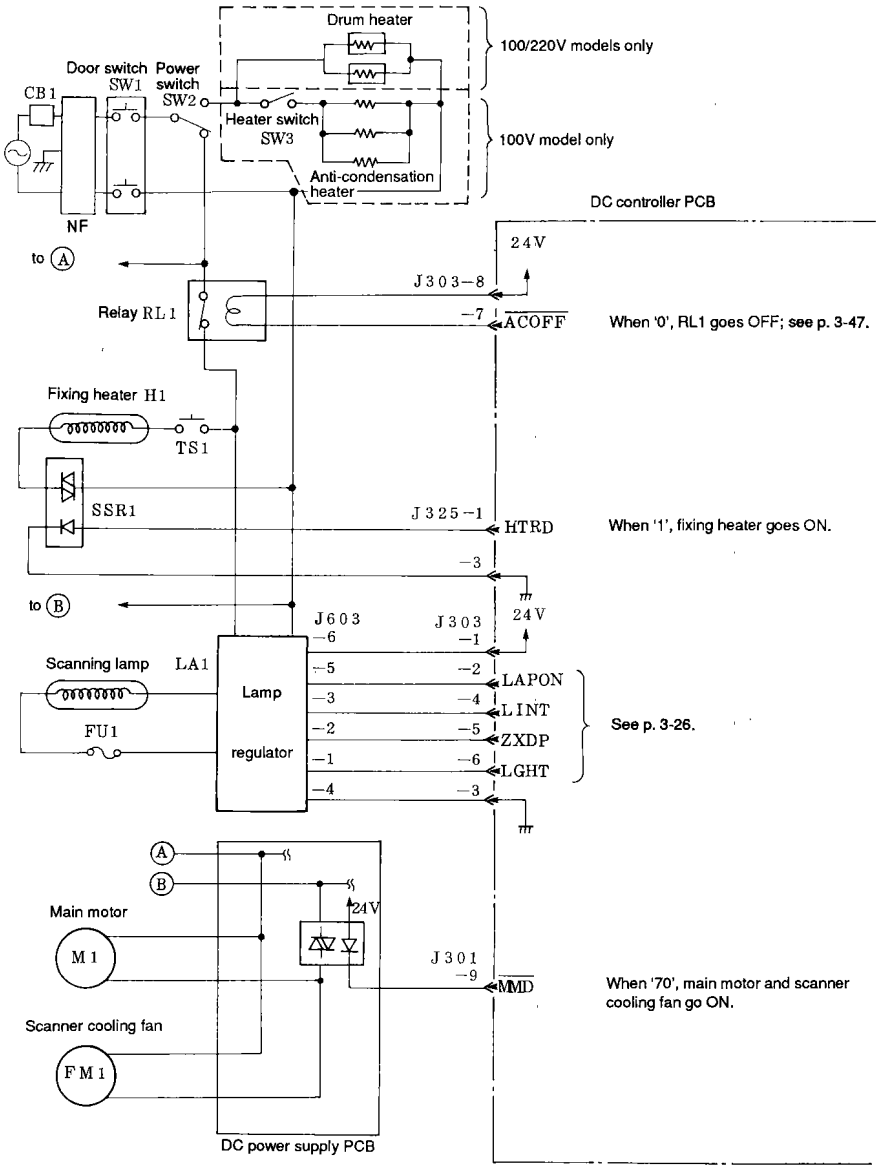

Figure 3-7

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Outputs from DC Controller (2/3)

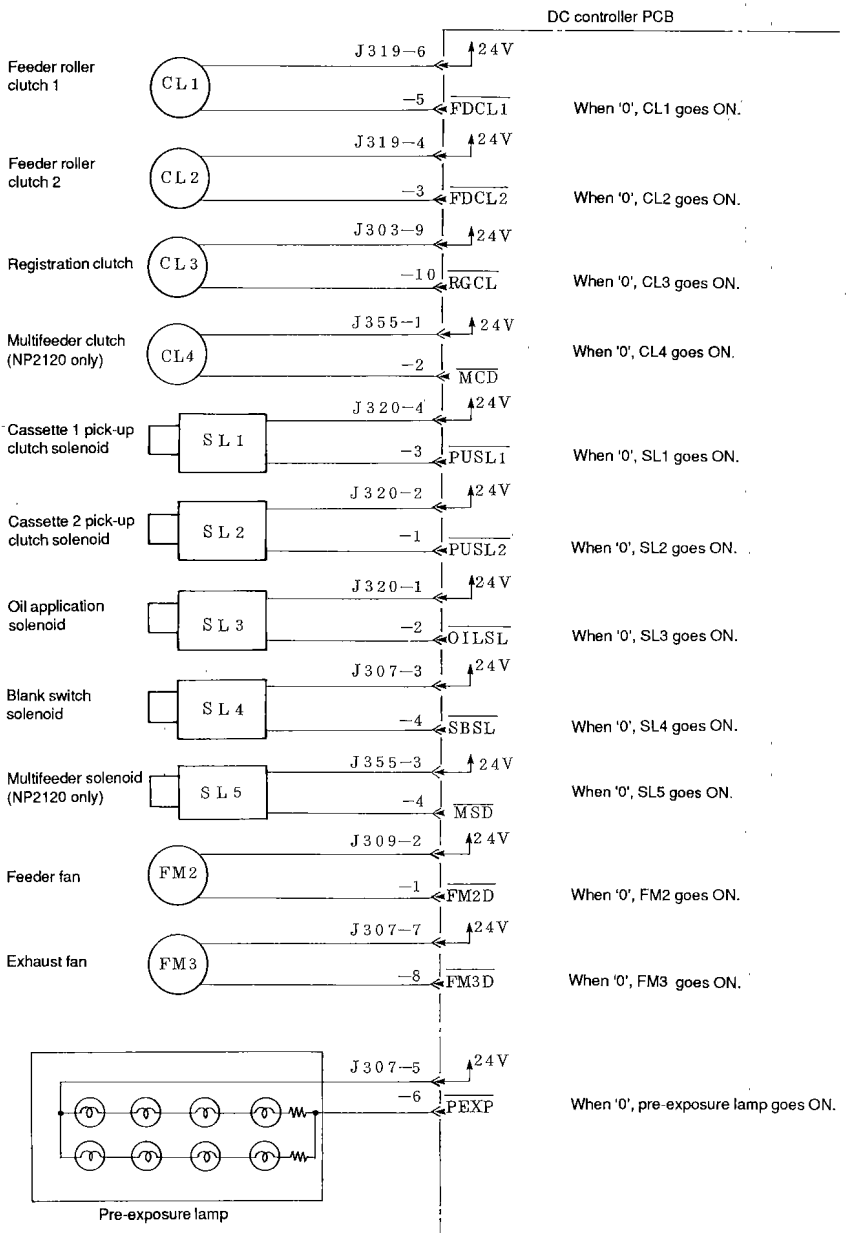

Figure 3-8

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Outputs from DC Controller (3/3)

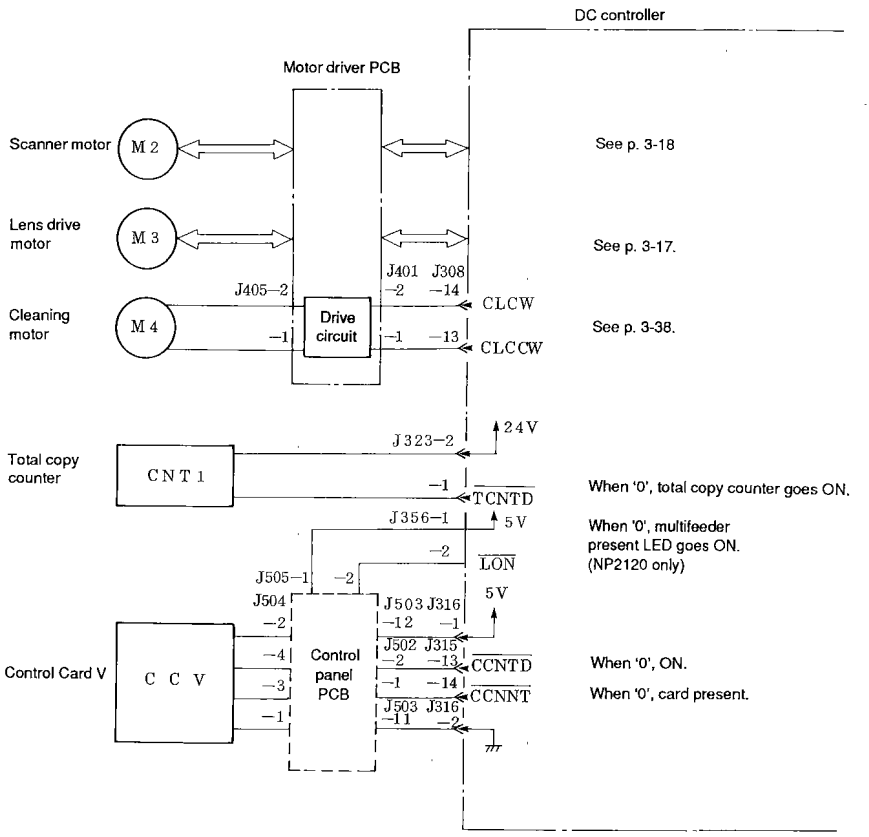

Figure 3-9

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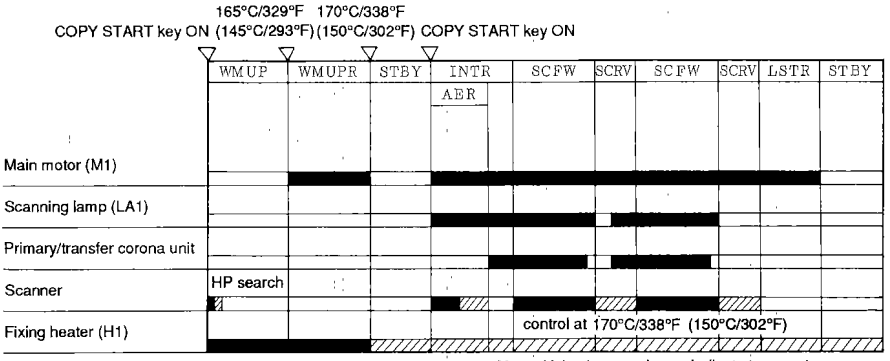
E. Basic Sequence



Note: Value in parentheses indicate temperature when CT unit is in use.

Figure 3-10

Period		Description	Remarks
WMUP (warm-up)	Between when the power is switched ON and when the fixing roller is heated to 165°C/329°F (145°C/293°F).	Waits until the fixing roller is heated.	The warm-up time varies depending on the fixing roller temperature.
WMUPR (warm-up rotation)	Between when the fixing roller is heated to 165°C/329°F (145°C/293°F) and to 170°C/338°F (150°C/302°F).	Stabilizes the fixing roller temperature.	
INTR (initial rotation)	Between when the COPY START key is pressed and when the scanner starts to move forward.	Stabilizes the drum sensitivity in preparation for copy operation.	
AER (AE measurement)	Between when the scanner is moved forward about 70 mm/2.8 in from the document leading edge and when it is returned to the home position.	Measures the density of the document by moving the scanner about 70 mm/2.8 in forward and in reverse.	The operation applies to the the AE mode only.
SCFW (scanner forward)	While the scanner is moving forward. • The length of forward travel varies according to the cas sette size and reproduction ratio. • The speed of forward travel varies according to the reproduction ratio.	The scanning lamp illuminates the document, and thereflected light is directed onto the photosensitive drum by way of mirrors and lens.	The registration signal is generated to move the copy paper to the transfer unit.

Note: Values in parentheses indicate the temperature when the CT unit is in use.

Table 3-1a

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Period		Description	Remarks
SCRV (scanner in reverse)	While the scanner is moving in reverse.	Returns the scanner to the home position in preparation for the next copy.	
LSTR (last rotation)	From when SCRV is completed until the main motor stops after the copy paper has moved past the delivery sensor.	Cleans the drum surface electrostatically.	The last copy is delivered.
STBY (standby)	From when LSTR is completed until the COPY START key is pressed or power is switched OFF.	Waits for a press on the COPY START key or operation keys.	

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II. EXPOSURE SYSTEM

A. Varying the Reproduction Ratio

The reproduction ratio across the drum (axial) is varied by the lens drive system and that around the drum (circumferential), by the scanner drive system.

The lens drive system contains a zoom lens and, as shown in Figure 3-11, the position of the lens and the focal distance are shifted to vary the reproduction ratio across the drum.

The scanner drive system moves the No. 1 mirror faster in relation to the drum rotation for reduced copies or slower for enlarged copies.

Note:
When in the DIRECT mode, the speed of the No. 1 mirror and that of the drum rotation are identical.

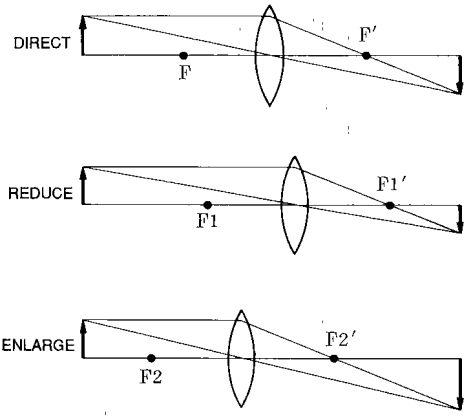

Figure 3-11

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B. Lens Drive System

1. Outline

The lens unit is driven by the lens drive motor (M3).

The lens drive motor also serves to move the blank exposure shutter and is switched by the blank shutter solenoid (SL4); see p. 3-37. When the blank shutter solenoid (SL4) goes ON, the drive is transmitted to the lens drive pulley to move the lens unit.

When the power is switched ON, SL4 goes ON to rotate the lens drive motor, thereby moving the lens to the home position. When the lens reaches the home position, the lens drive motor rotates in reverse; it then stops after the signal plate has left the sensor (Q1) and a specific number of pulses has been generated, positioning the lens at the DIRECT position.

Likewise, the lens is first moved to the home position also for both enlargement and reduction operations; it is then moved and positioned at a point suited to the specified reproduction ratio.

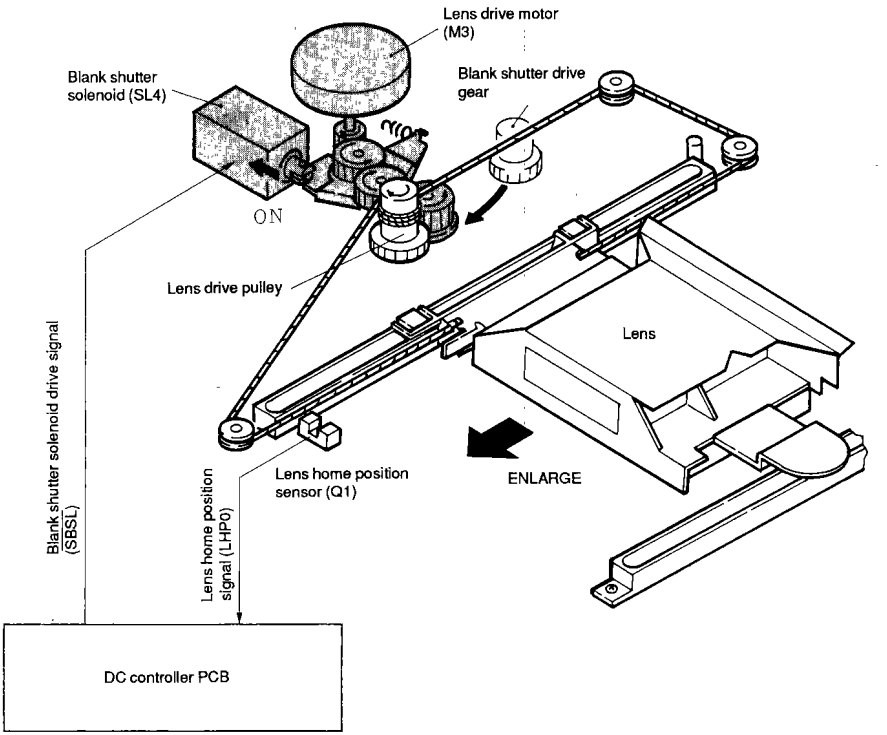

Figure 3-12

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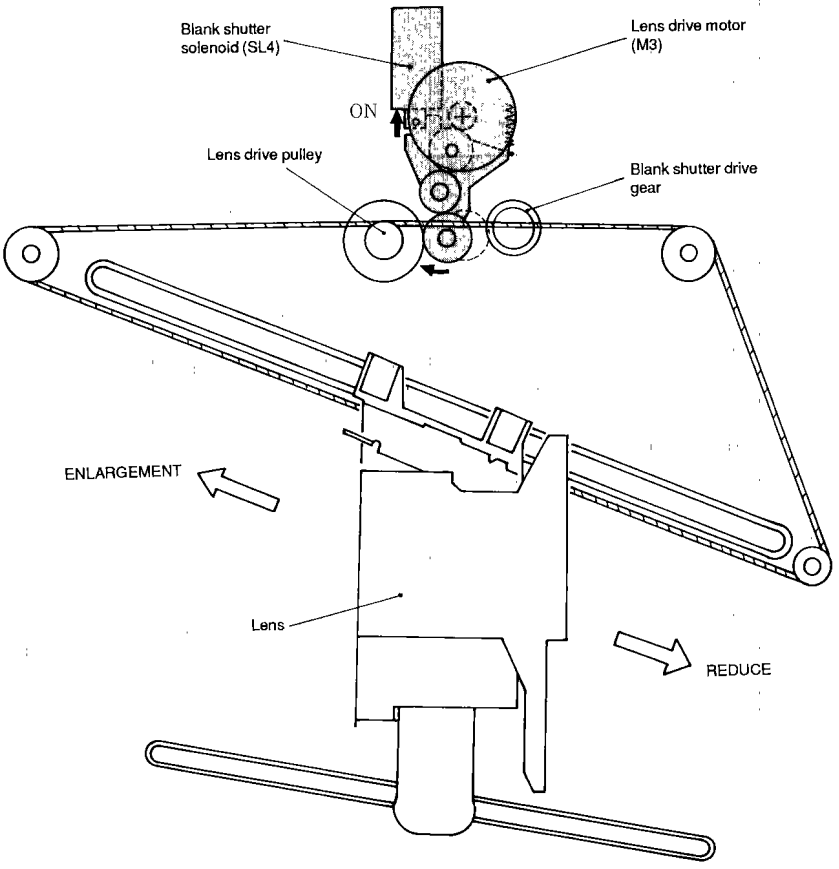

Figure 3-13 Lens Drive System (viewed from above)

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2. Basic Sequence for Lens Drive System (reduction)

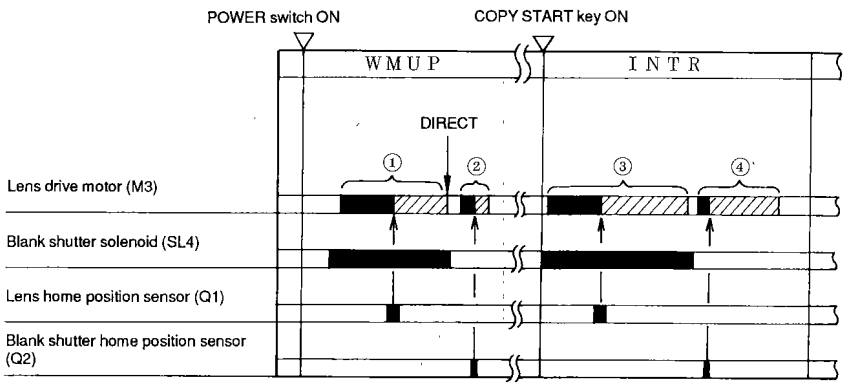

Figure 3-14

① Sets the lens at the DIRECT position.
② Sets the blank shutter at the home position.
③ Sets the lens at a point suited to the specified reproduction ratio.
④ Moves the blank exposure shutter for blank exposure (rear) to suit the specified reduction ratio.

The copier's blank exposure shutter is designed to move according to the specified copy size; as such, the shutter moves also in the DIRECT mode.

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3. Lens Drive Motor Circuit

The lens drive motor is a stepping motor and rotates in response to the drive power signal (LNSTB) and pulse signals (LNA, LNA, LNB, LNB).

To start the lens drive motor, LNSTB goes '1'; and the motor is rotated by applying pulses on each phase in sequence.

When the lens drive motor is at rest, LNSTB is '0'; the motor is supplied with current by way of R418 so as to hold the lens in place.

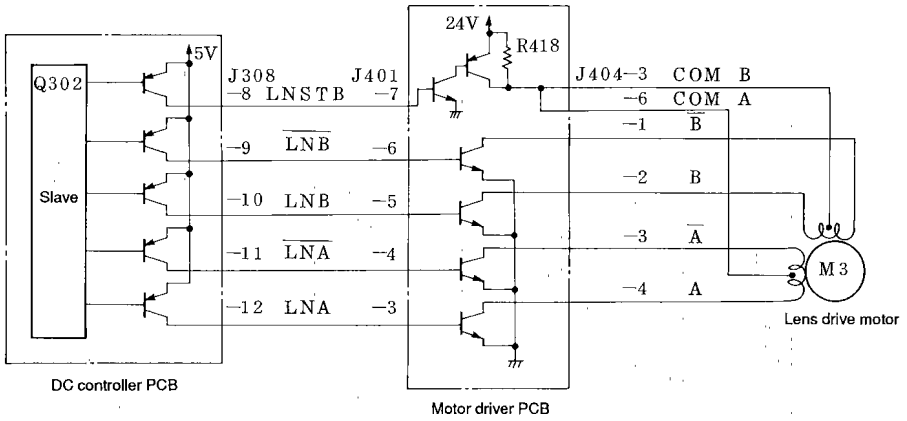

Figure 3-15

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C. Scanner Drive System

1. Outline

The scanner is driven by the scanner motor (M2). The scanner motor changes its direction of rotation to move the scanner forward and in reverse. When the scanner moves forward, the motor speed is changed to suit the specified reproduction ratio; when the scanner mover in reverse, however, its speed is constant regardless of the reproduction ratio (3.5 times as fast as when moving forward).

The distance over which the scanner moves varies according to the length of the copy paper and the reproduction ratio.

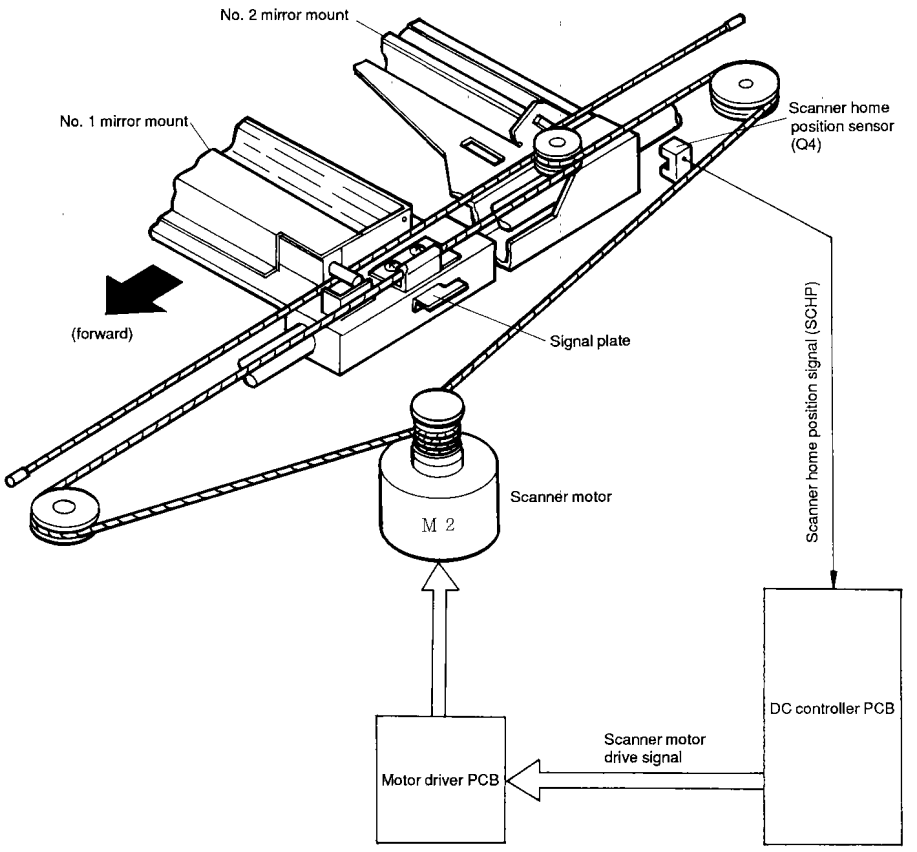

Figure 3-16

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2. Relationship Between Sensor and Signals

Scanner sensor	Signal	Scanner		Description
		Forward	In reverse	
Scanner home position	SCHP	↓		• Registration clutch ON • Grid high voltage output ON
			↑	• Scanner reverse OFF (0.1 sec later)

Table 3-2

3. Basic Sequence for Scanner (ENLARGE/REDUCE)

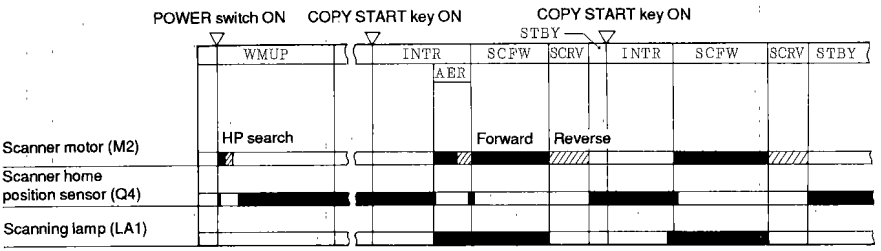

Figure 3-17

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4. Movement of Scanner in Page Separation Mode (2 documents)

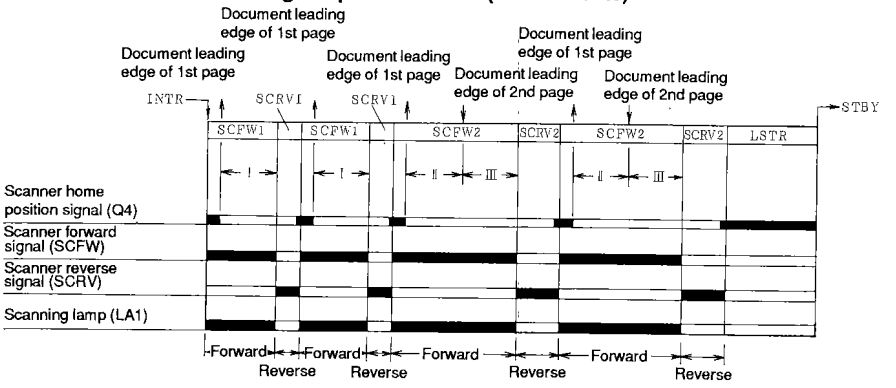

Figure 3-18

I, II, and III shown in Figure 3-18 are controlled with reference to the document leading edge (falling edge of Q4) of the first page.

I: The distance over which the scanner moves from the document leading edge is determined by the reproduction ratio and cassette size as in the normal copy mode.

II: It is more or less identical to I; however, if the distance over which the scanner moves forward is longer than 210 mm/8.3 in (115/220/240V models), 210 mm/8.3 in (216 mm/8.5 in) will be identified as the reference to the document leading edge.
If the distance is shorter than 210 mm/8.3 in (216 mm/8.5 in), the point at which the scanner reverses will be identified as the document leading edge of the second page.

III: Same as I.

Note:
The distance over which the scanner moves cannot exceed 432 mm/17 in from the document leading edge (the point reached by the scanner having moved forward 10 mm/0.4 in from the falling edge of Q4); further, the distance is limited by the specified reproduction ratio.
In the case of enlargement by 200%, the distance is 216 mm/8.5 in max.

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D. Document Size Identification

1. Outline

The copier is equipped with auto paper selection and auto reproduction ratio selection mechanisms. These mechanisms call for identification of the document size as described below.

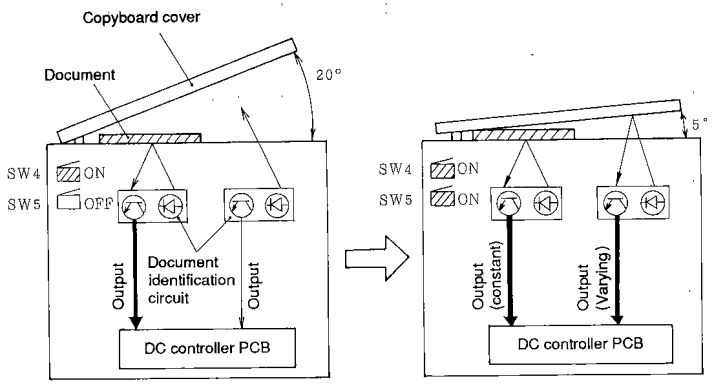
To enable such identification, three circuits are attached under the copyboard glass (Figure 3-21); when the copyboard cover is lowered, the DC controller checks the output of these circuits twice, thereby identifying the document as Ledger, Legal, Letter, or Mini.

The document identification circuit causes its LED to emit light to illuminate the document; the reflected light is then checked by the phototransistor, whose output is sent to the DC controller.

2. Mechanism

The DC controller checks the output of the document identification circuit when the copyboard cover is lowered to about 20 deg. (SW4 ON) and about 1 sec second after the over has been lowered to about 5 deg. (SW5 ON).

The DC controller recognized the presence of a document if the two measurements are identical; conversely, it recognizes the absence of a document if the measurements are different.



(The thickness of the arrows represents the degree of the level.)

Figure 3-19

When a document is present, the light reflected by the document is checked by the document identification circuit; therefore, the output of the circuit is constant regardless of the angle of the copyboard cover.

When no document is present, the output of the circuit from the first measurement is low or none at all; the output of the circuit from the second measurement, on the other hand, is high because the light is reflected by the document sheet.

If the document is too thick and, therefore, if only SW4 goes ON, the document size is identified based on the output level of this time.

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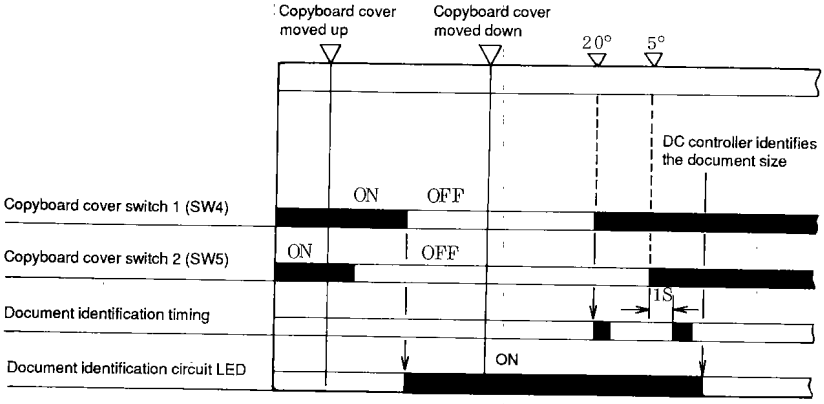

Figure 3-20 Document Identification Timing

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3. Identification of Document Size

The DC controller identifies the size of documents based on the levels of the output from the document identification circuit; see Table 3-3.

No.	Document Size	Document identification circuit		
		0	1	2
1	A3	constant	constant	constant
2	B4	constant	varying	constant
3	A4	constant	constant	varying
4	B5	constant	varying	varying
5	A4R	varying	varying	constant
6	B5R	varying	varying	varying

constant: no change to output of document identification circuit; recognizes resence of document.

varying: change to output of document identification circuit; recognizes absence of document.

Table 3-3

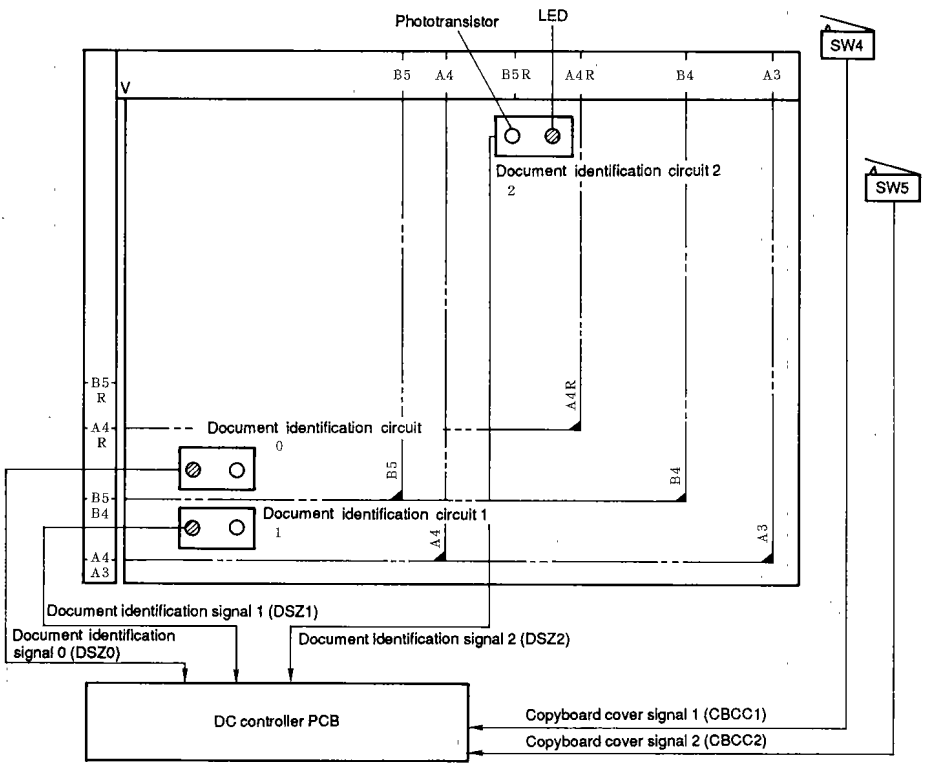

Figure 3-21

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III. IMAGE FORMATION SYSTEM

A. Outline

Figure 3-22 shows the construction of the image formation system, and the system has the following functions:

- Controls the scanning lamp.
- Controls the primary/transfer corona current and grid bias voltage.
- Controls the developing bias.
- Measures the document density.
- Controls the developing assembly and drum cleaning unit.
- Controls the blank shutter.

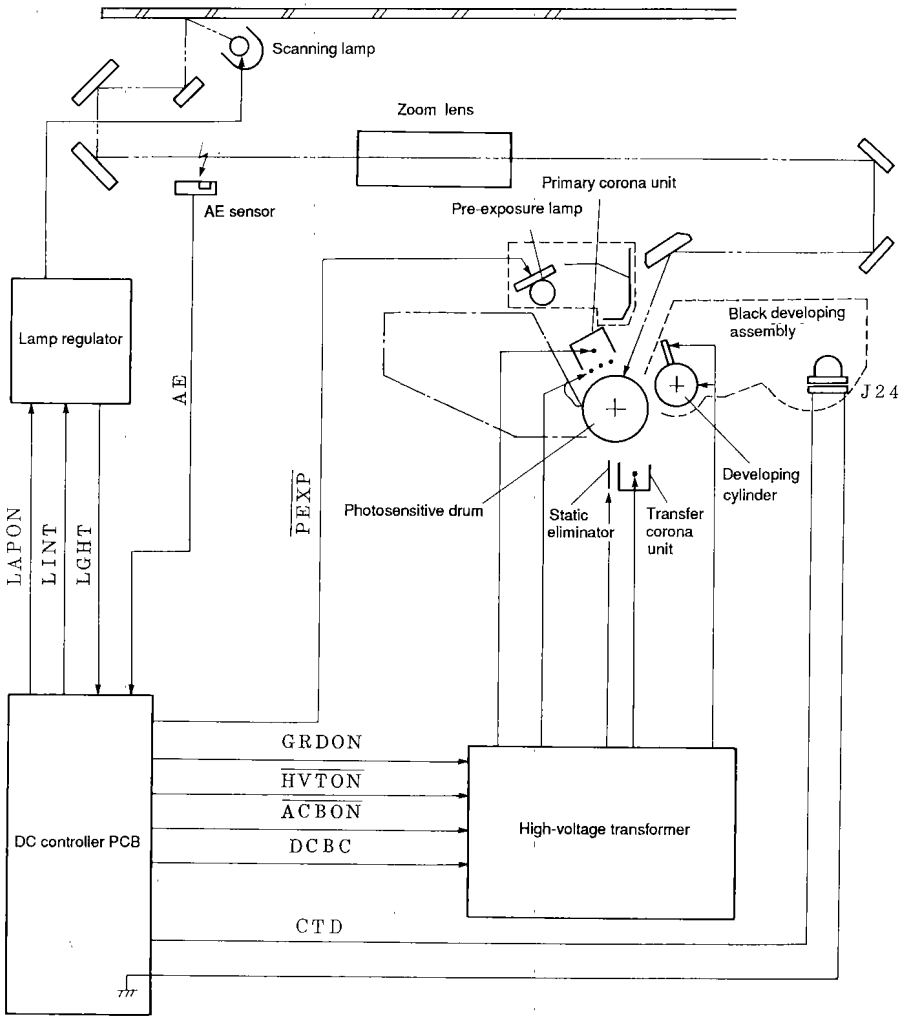

Figure 3-22

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B. Basic Sequence of Image Formation

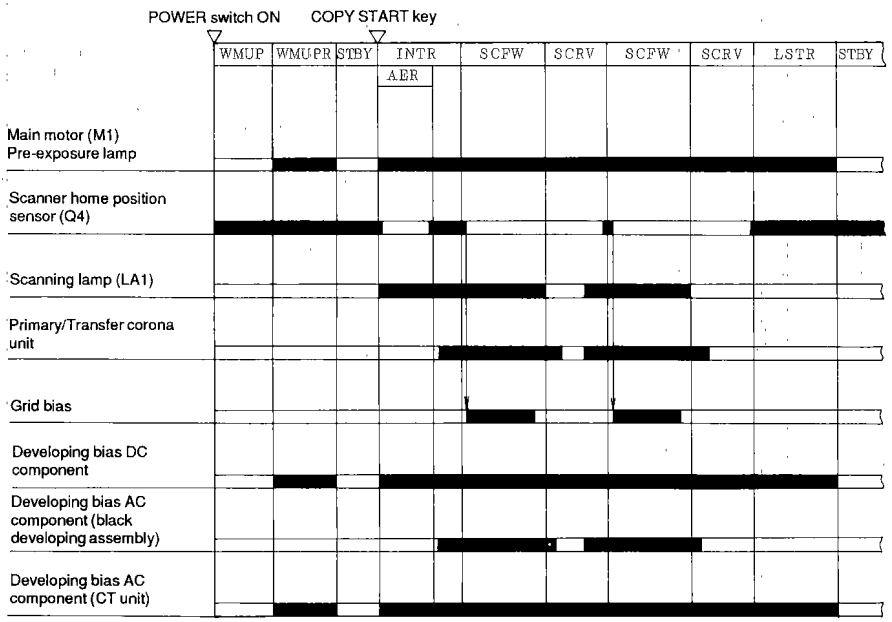

Figure 3-23

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C. Controlling the Scanning Lamp

1. Outline

The scanning lamp is controlled by the DC controller PCB as follows; see Figure 3-24.

- Turns the scanning lamp ON and OFF.
- Controls the scanning lamp intensity.

2. Mechanism

a. Turning the Scanning Lamp ON and OFF
The microprocessor (slave; Q302) on the DC controller PCB causes the transistor (Q324) to go ON, thereby causing the scanning lamp (LA1) to go ON; the lamp goes OFF when Q324 goes OFF.

b. Controlling the Scanning Lamp Intensity
The intensity of the scanning lamp is varied by controlling the voltage supplied to it in response to the level of the intensity adjustment signal (LINT) from the DC controller PCB.

The LINT signal varies between 10 and 16 V as determined by the copy density correction lever, controlling the voltage supplied to the scanning lamp so that it varies between 50 and 75 V (phase control).

When the CT unit is used, the voltage applied to the scanning lamp is raised by about 1.8 V as opposed to when the black developing assembly is used so as to increase the intensity of the scanning lamp. A constant voltage (70 V), however, is applied to the scanning lamp during AE exposure for both the black developing assembly and CT unit.

c. Error Identification Circuit
The scanning lamp is monitored using the lamp ON signal (LIGHT).

If the scanning lamp ON signal (LIGHT) is present on the DC controller for about 20 sec continuously, the error identification signal generates the AC power OFF signal ($\overline{ACOFF}$) to cut off the AC power; see p. 3-47.

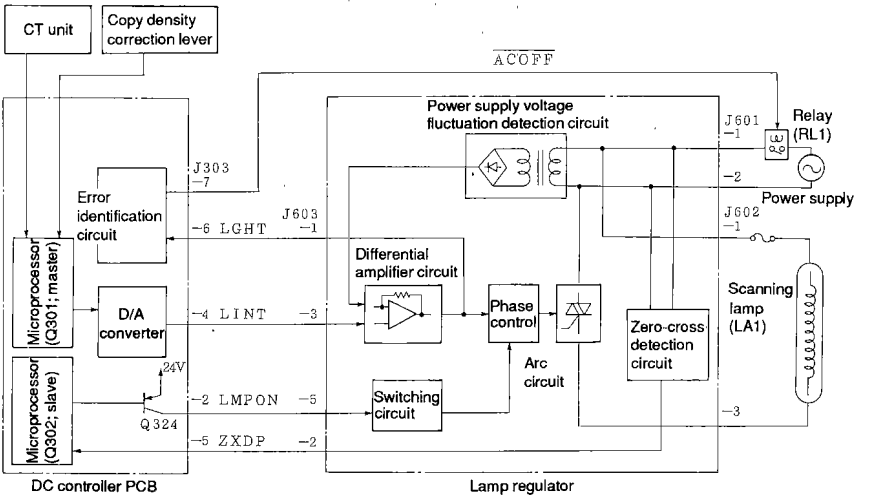

Figure 3-24

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The error detection circuit also goes ON when the thermal fuse (Fu1) or the scanning lamp blows, causing the relay (RL1) to go OFF and cutting the AC power.

The above condition prevents generation of the zero-cross and causes 'E221' to be indicated on the control panel.

3. Copy Density Correction Lever

The copy density correction lever serves to prevent foggy images caused by deterioration of the photosensitive drum. The copy density correction lever changes the intensity of the scanning lamp, and a higher frees the copies of fogging.

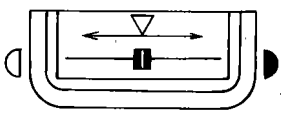
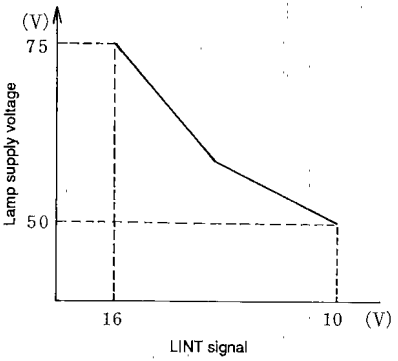


Figure 3-25 Copy Density Correction Lever



(Set by copy density correction lever.)

Figure 3-26

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D. Controlling the Primary/ Transfer Corona Current and the Grid Bias Voltage

1. Outline

Figure 3-27 shows the circuit which controls the current for the primary/transfer corona unit and the voltage level of the grid bias; it has the following functions:

① Turns the primary/transfer corona current ON and OFF;
② Controls the primary/transfer corona current to a constant value;
③ Switches the grid bias voltage level of the primary corona unit.
④ Controls the grid bias voltage of the primary corona unit.

The output to the primary corona unit is controlled to a constant value; the shield current is controlled to eliminate the effects of environmental changes on the corona discharge.

The primary corona current and transfer corona current are turned ON and OFF by the high-voltage output signal ($\overline{\text{HVTON}}$).

The grid bias voltage level is switched by the grid bias control signal (GRDON).

2. Turning the Primary/Transfer Corona Current ON and OFF

① When HVTON = 1,
└▶differential amplifier circuit goes OFF.
└▶variable pulse generator circuit goes OFF.
└▶High-voltage transformer goes OFF.

② When HVTON = 0,
└▶differential amplifier circuit goes ON.
└▶variable pulse generator circuit goes ON.
└▶High-voltage transformer goes ON.

3. Controlling the Primary/Transfer Corona Current Constant

If a corona current larger than the specific value flows from the primary corona unit because of changes in the environment, the level of the feedback signal to the ifferential amplifier circuit increases and the output of the circuit decreases; the condition in turn decreases the corona current from the primary/transfer corona unit, thereby controlling the current to a specific value.

If an over-current flows on the output side of the high-voltage transformer used for primary/corona unit, the limit control mechanism is activated to keep the flow to a specific value.

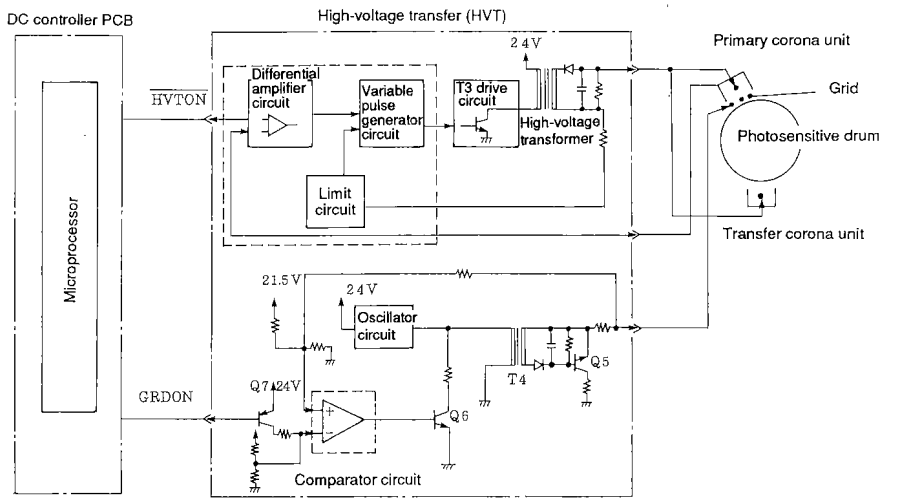

Figure 3-27

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4. Turning the Grid Bias ON and OFF

① When the image is exposed, the DC controller generates
└▶GRDON=0.
└▶Q7 goes ON; no output from the comparator circuit.
└▶Q6 goes OFF.
└▶current flows into the transformer (T4); Q5 goes OFF.
└▶grid bias is applied.
└▶rum is charged.

The voltage applied to the grid is returned to the comparator circuit, thereby providing a constant voltage.

② When the image is not exposed, the DC controller generates GRDON=1.
└▶Q7 goes OFF; output from the comparator circuit.
└▶Q6 goes ON.
└▶current does not flow into the transformer (T4).
└▶grid bias is not applied.

The above condition does not charge the drum and, as such, toner is not attracted to the photosensitive drum (blank control).

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E. Controlling the Development Bias

1. Outline

Figure 3-28 shows the circuit that controls the development bias and has the following functions:

① Turns the development bias AC component ON and OFF.
② Controls the development bias DC component voltage level.

The copier varies the voltage level of the development bias to control the copy density according to the settings of the following:

- Copy density key position
- AE sensor output
- Developing assembly type

When the black developing assembly is set, J24-1 and -4 are shorted by means of a jumper wire, thereby identifying the presence of the assembly.

2. Mechanism

a. Turning the Development Bias AC Component ON and OFF

The square wave oscillator circuit is at work at all times as long as power is present.

① When $\overline{\text{ACBON}}$=1,
↳AC bias switch circuit goes ON.
↳square wave oscillator circuit output is cut.
The above condition deprives the developing cylinder of AC biases.

② When $\overline{\text{ACBON}}$=0,
↳AC bias switch circuit goes OFF.
The above condition causes the AC bias switch circuit to go OFF; as such, the output of the square wave oscillator is sent to the T1 drive circuit, raised to 1300 VAC, and is supplied to the developing cylinder. The output of the AC high-voltage transformer, on the other hand, is rectified by the rectifier circuit and supplied to the static eliminator (about 3.2 KV).

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b. Controlling the DC Bias Voltage Level

Figure 3-28 shows the differential amplifier circuit, which operates when DCBC is 16 V or less.

Controlling the DC Bias Voltage Level
DCBC is 6 to 16 V.
↳▶differential amplifier circuit goes ON.
↳▶variable pulse generator goes ON.
↳▶DC high-voltage transformer goes ON.

The above condition supplies the developing cylinder with DC biases.

DCBC varies between 6 and 16 V as adjusted by the copy density key.

DCBC	6 to 16 V
Development bias DC component (black developing assembly)	–450 to –80 V
Developing bias DC component (CT unit)	–480 to –110 V

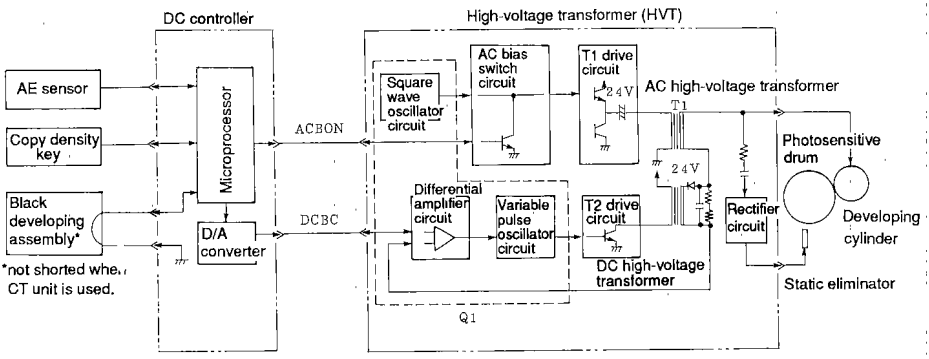

Figure 3-28

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3. Control Sequence for Development Bias

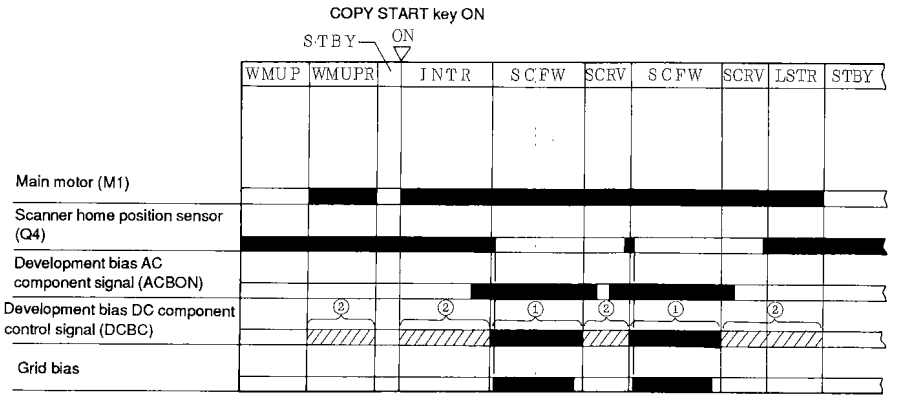

Figure 3-29

① The levels of the development bias DC component control signal and DC bias vary according to the copy density key and AE sensor output.
The level of the DC bias during image exposure varies according to the type of developing assembly.

② The level of the DC bias varies according to the type of developing assembly; other than during image exposure.
- black developing assembly .....–320 V (approx.)
- CT unit .....–220 V (approx.)

Note:
The development bias AC component when the CT unit is used is synchronized to the main motor.

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F. Measuring the Document Density

1. Outline

The copier has an automatic exposure (AE) mechanism, which controls the DC component of the development bias according to the density of the document. If the document is uniform in density, the AE mechanism varies the DC omponent of the development bias to enable reproduction of fog-free copies.

2. Mechanism

The scanner is moved forward about 70 mm from the image leading edge with the scanning lamp kept ON; the AE sensor reads the document density, and the output is sent to the DC controller.

Based on the output from the AE sensor, the DC controller controls the DC component of the development bias.

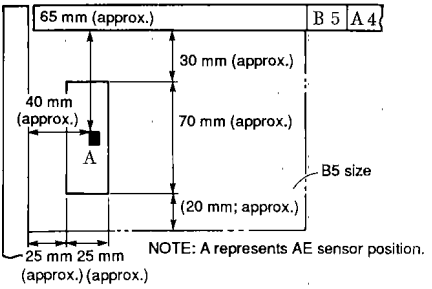

Figure 3-30

3. Reading the AE Sensor Output

The AE sensor consists of a photodiode (Q702) and operation amplifier (Q701); when the light received by the photodiode (reflected by the document) is strong, the output voltage (AE) of the operation amplifier is low; on the other hand, if the The DC controller reads the output (AE) of the AE sensor based on the zero-cross signal (ZXDP) sent by the lamp regulator.

The limiter circuit consists of Q701 (2) and diodes and serves to cut AE output of 5 V or more to prevent damage to the microprocessor (Q302).

If the AE output falls under 1.0, a voltage of 1 V will be assumed; if the AE output rises above the setting of VR2, it is lowered to maintain the setting.

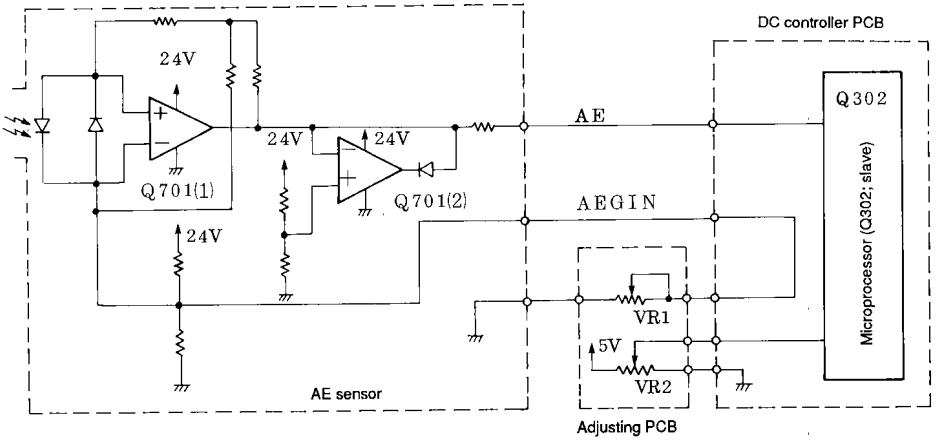

Figure 3-31

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4. Adjustment

The following adjustments should be made when the AE sensor or adjustment PCB has been replaced; start with adjustment of the AE reference point and then AE slope, and make sure both adjustments are made without fail.

① Adjusting the AE Reference Point

1) Remove the adjustment cover from the rear of the left cover.
2) Switch the power ON.
   - Wait until the WAIT state is over and the COPY READY indicator is green.
3) Place an NB-3 Test Sheet or NA-2 Test Sheet, and close the copyboard cover.
4) Press the push switch (SW1; service switch) on the adjusting PCB.
   - '0' will be indicated on the copy counter on the control panel.
   - If the indication is not '0', enter '0' on the tenkey pad on the control panel.
5) Press the SORT/GROUP key on the control panel.
   - The scanner moves forward to the AE measurement point, and the scanning lamp goes ON.

Note:
The scanning lamp remains ON for about 8 sec; to turn it ON once again, press the SORT/GROUP key, and press the key once gain after the operation stops.

6) Adjust VR1 (AE ref.) on the adjusting PCB so that the copy counter on the control panel indicates '20'.

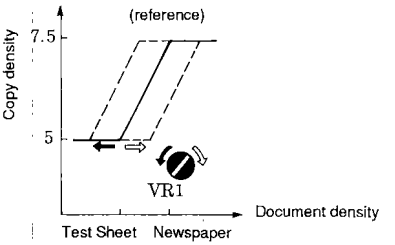

Figure 3-32

7) Press the SORT/GROUP key after making adjustments.
   - The scanning lamp goes OFF, and the scanner returns to the home position.

"(2) AE slope adjustment" should be made continuously.
AE adjustment can be completed by performing "(1) AE reference point adjustment" though "(2) AE slope adjustment".

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② Adjusting the AE Slope

1) Remove the Test Sheet, place a newspaper on the copyboard, and close the copyboard cover.
2) Press the SORT/GROUP key on the control panel.
   • The copier operates as in step 5) of "Adjusting the AE Reference Point."
3) Take notes of the value shown on the copy counter of the control panel.
4) Press the SORT/GROUP key on the control panel.
   • The copy counter on the control panel will indicate '0'.
5) Enter '1' on the tenkey pad on the control panel.
   • The copy counter on the control panel will indicate '1'.
6) Press the SORT/GROUP key.
7) Turn VR2 (AE slope) on the adjusting PCB so that the value on the copy counter of the control panel is the same as the value recorded in step 3).

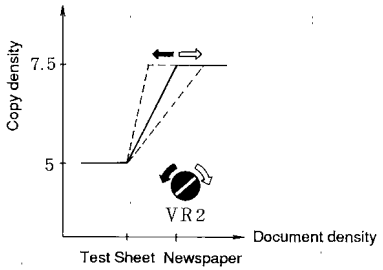

Figure 3-33

8) Press the SORT/GROUP key after making adjustments.
9) Press the push switch (SW1) on the adjusting PCB.

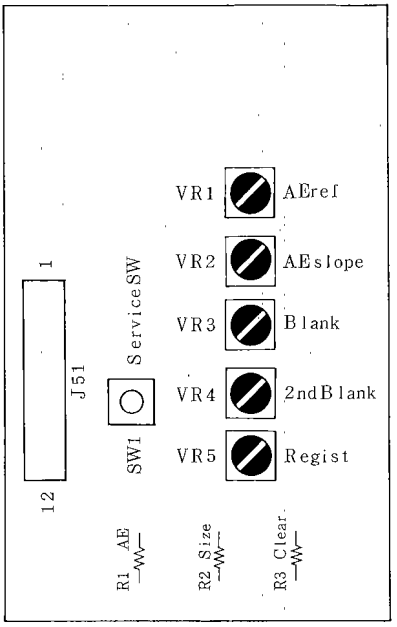

Figure 3-34 Adjusting PCB

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G. Developing Assembly and Drum Cleaning Unit

1. Outline

The blade and developing cylinder inside the drum cleaning unit are rotated by the drive from the main motor.

The level of toner inside the black developing assembly is monitored by the toner sensor (Q9); and, when the level falls below a specified value, the ADD TONER indicator on the control panel starts to flash.

The CT unit cannot be replenished with toner; replace the CT unit as a whole when it runs out of toner.

The toner collected by the cleaning blade is stored inside the drum cleaning unit.

The developing assembly is brought into contact with the photosensitive drum together with the developing assembly rail by the developing assembly release lever.

2. Monitoring the Toner Level

A piezoelectric oscillator toner sensor (Q9) is provided inside the black developing assembly to monitor the level of toner.

The output of the toner sensor remains '1' as long as a specific level of toner is inside the assembly; when the toner decreases below the level, the output goes '0'.

The DC controller reads the output signal for 5 sec after copy operation is over; if the signal remains '0' continuously, it recognizes 'no toner 1'. When 'no toner 2' is recognized, the DC controller flashes the ADD TONER indicator and prohibits copy operation.

The CT unit is not equipped with a toner level detection mechanism, or the cleaning unit is not equipped with a waste toner level detection mechanism.

3. Torque Limiter

If a large load is imposed on the photosensitive drum while the drum is rotating for some reason, the torque limiter cuts off the drive from the main motor to stop the rotation of the drum.

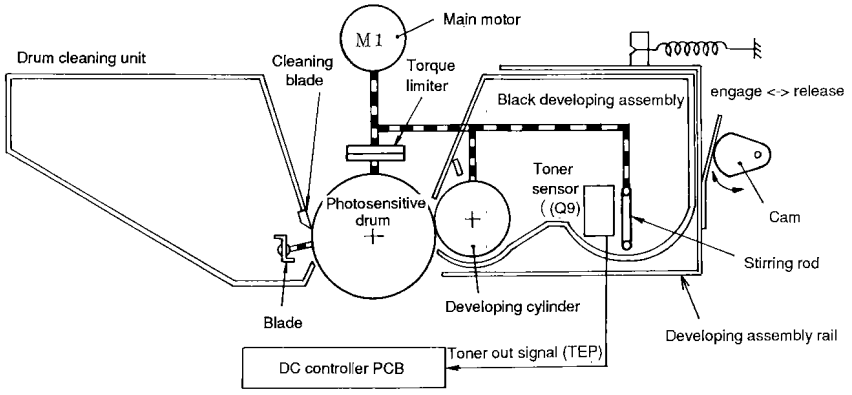

Figure 3-35

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H. Blank Control

1. Outline

To black out (white out) the non-image section between two copies, the copier changes the potential on the grid bias of the primary corona unit instead of using blank exposure; see p. 3-29.

To black out the non-image section for reduced copies or section not in contact with the drum in the DIRECT mode, the light of the pre-exposure lamp is directed against the drum by way of the reflecting plate, thereby preventing adhesion of toner on the drum.

2. Controlling the Blank Exposure Shutter

The copier uses the light from the pre-exposure lamp to black out the non-image section in the REDUCE mode or section not in contact with the drum in the DIRECT mode.

The blank exposure shutter serves to control the area over which the light is directed.

The blank exposure shutter is operated by the drive from the lens drive motor (M3) by way of gears when the blank shutter solenoid (SL4) is OFF.

The lens drive motor first returns the blank exposure shutter to the home position (at Q2); it then rotates in response to the drive pulses from the DC controller suited to the reduction ratio, thereby sliding the blank exposure shutter.

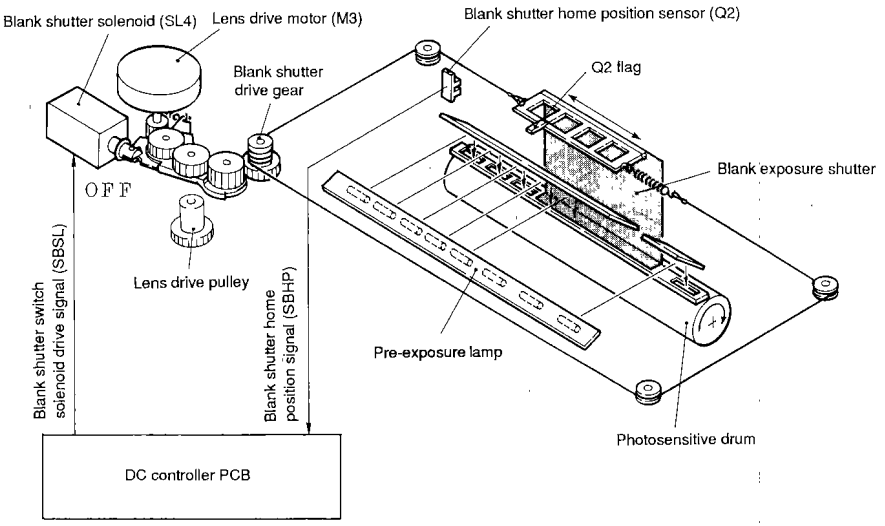

Figure 3-36

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I. Controlling the Transfer Corona Wire Cleaning Mechanism

1. Outline

The copier has an automatic cleaning mechanism for the transfer corona wire; cleaning is executed when the power switch is turned ON or when the fixing assembly is 100°C/212°F or below.

2. Cleaning Mechanism

The wire cleaner is moved by the cleaner motor (M4) back and forth once along the wire (about 20 sec).

When the wire cleaner mount moving forward by M4 actuates the microswitch (SW9) located at the rear of the transfer rail, M4 rotates in reverse to move the wire cleaner in reverse.

The wire cleaner stops when the wire cleaner mount actuates the microswitch (SW6) located in front of the transfer rail (home position). If SW6 is not actuated, the COPY START key on the control panel remains red for 90 sec even after the wait period is over.

If the power is turned OFF in the middle of cleaning operation, the wire cleaner mount stops where it is. If the transfer corona assembly has been dertached in this condition, attach it back to the copier while holding the wire cleaner at the rear by hand.

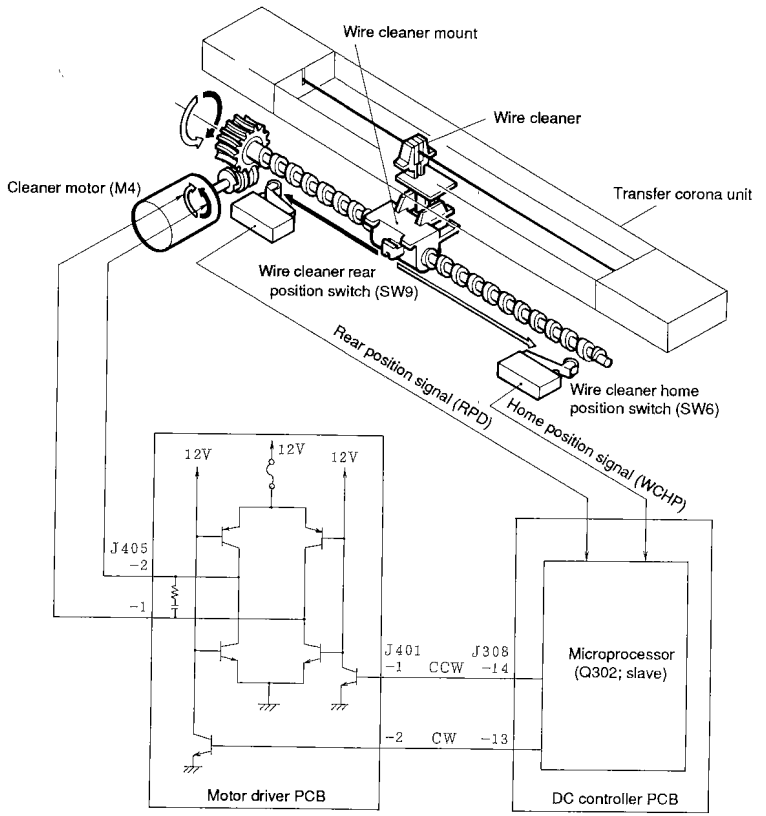

Figure 3-37

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IV. PICK-UP/FEED SYSTEM

A. Outline

Figure 3-39 shows the basic construction of the pick- up/feed system.

When the pick-up clutch solenoid (SL1 or SL2) goes ON while the main motor (M1) is rotating, the drive of the main motor causes the pick-up roller to rotate, thereby moving the paper to feeder roller 1 or 2.

After having passed through the feeder roller, the copy paper is moved by the registration roller so that the leading edge of the image on the photosensitive drum and that of the copy paper match; thereafter, the paper is sent to the transfer unit, separation unit, feeder unit, fixing assembly, delivery unit, and to the copy tray.

The path along which the copy paper moves is provided with photointerrupters (Q3, Q5) servicing as the pre- registration and separation sensors and with a contact sensor* (SW8), as the delivery sensor. If the paper fails to reach or pass the sensors within a specific period of time, the condition is identified as a jam and the JAM indicator on the control panel starts to flash.

The counter increases by one when the delivery sensor (SW8) detects the trailing edge of the copy paper.

The control card, on the other hand, increases the count in response to each pick-up.

The presence of paper in the upper and lower cassettes is checked by photointerrupters (Q6, Q7); if paper is absent, the cassette out signal (UPCPD, LCPD) goes '0' and the ADD PAPER indicator on the control panel starts to flash.

* The contact sensor used as the copier's delivery sensor (SW8) makes use of attraction of a permanent magnet to drive the reed switch.

  The paper detection lever is equipped with a permanent magnet and, when the magnet comes into contact with the reed switch, the switch goes OFF; the switch goes ON (paper resent) when the magnet is off contact.

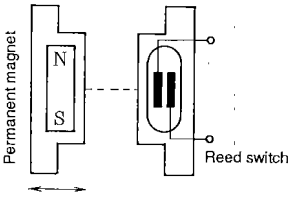

Figure 3-38 Contact Sensor

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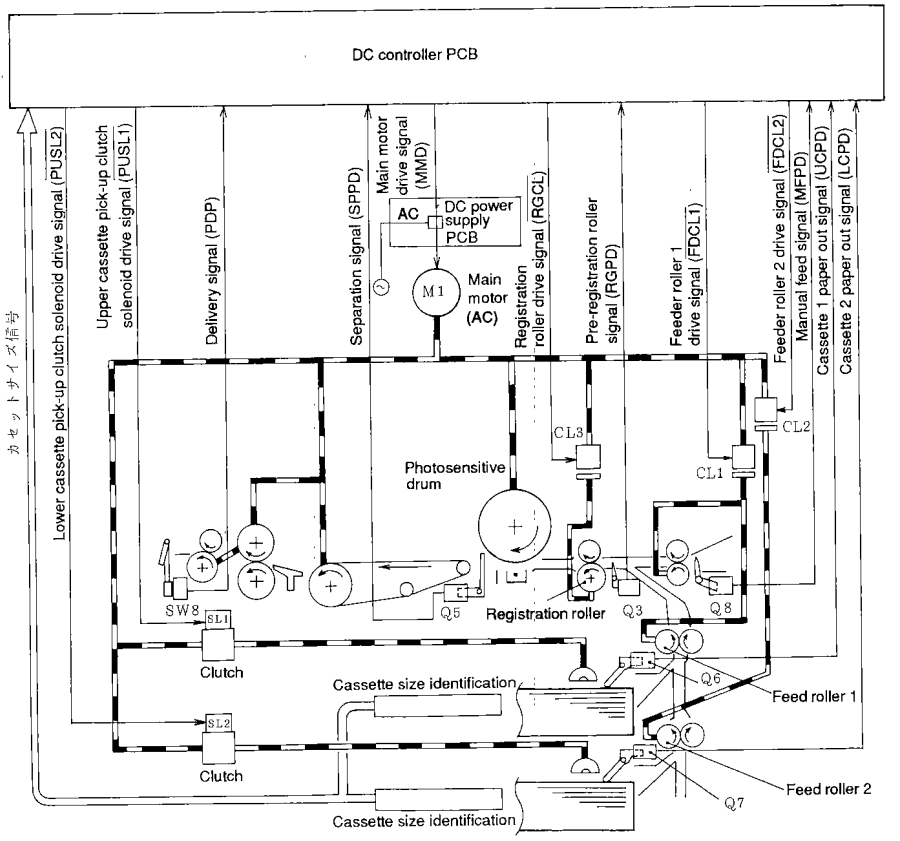

Figure 3-39

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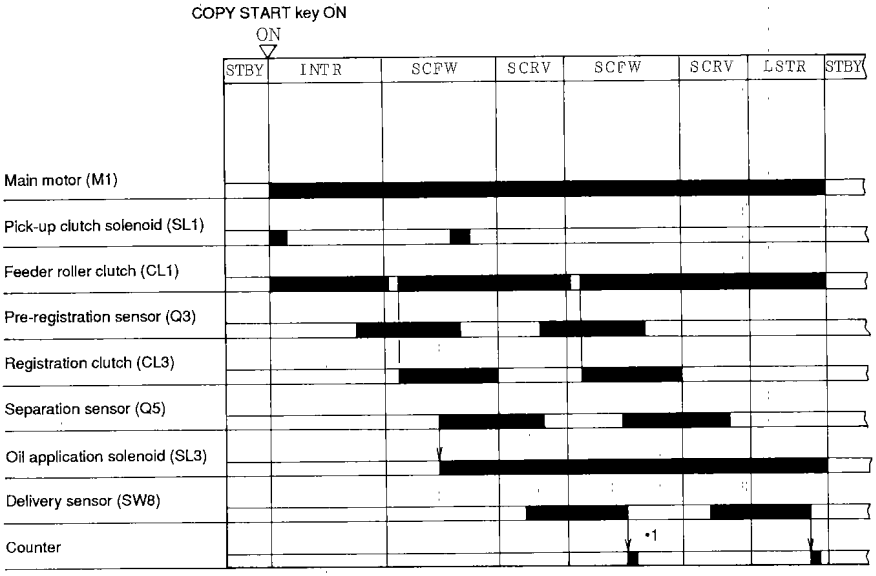
2. Sequence for Pick-up/Feed System



* Control Card V, if attached, increases the count when the pick-up clutch solenoid (SL1, SL2) goes ON.

Figure 3-40

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3. Manual Feed Pick-Up (NP2020)

When copy paper is slid along the manual feed tray, the manual feed sensor (Q8) detects the copy paper and the main motor (M1) starts to rotate in response.

At the same time, feeder roller clutch 1 (CL1) goes ON, thereby feeding the paper up to the registration roller.

The sequence used to feed the copy paper in the manual mode is the same as in feeding A3 paper regardless of the size of the copy paper.

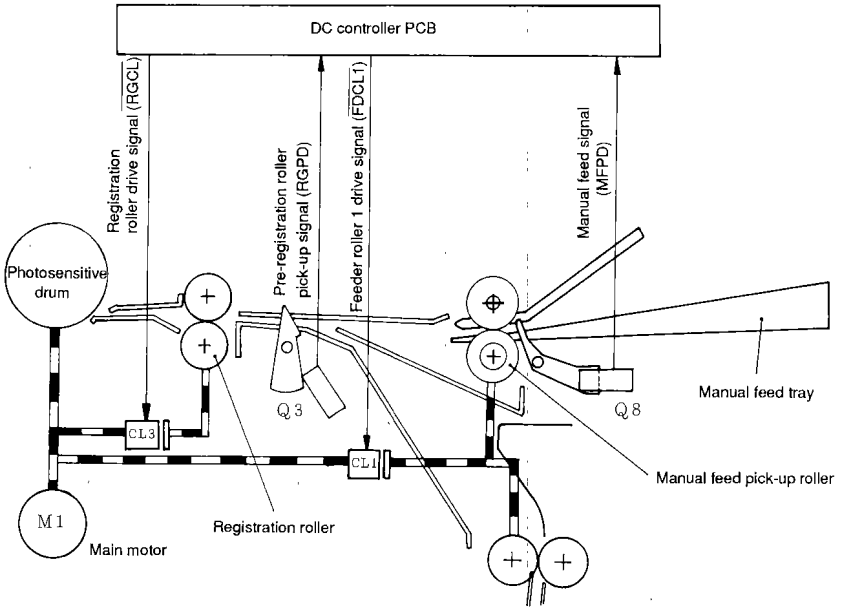

Figure 3-41

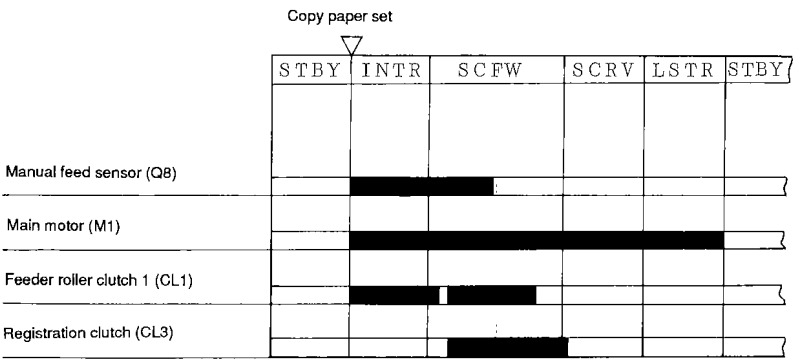

Figure 3-42

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4. Using the Multifeeder (NP2120)

a. Outline

When you are using the multifeeder, copy paper is picked up from the stack on the tray. This way, you can feed sheets one after another.

The presence of a stack on the tray is detected by the multifeeder paper sensor (Q8).

The stack on the tray is pushed against the pick-up roller by the paper guide plate. The pick-up roller is rotated by the drive from the main motor (M1) transmitted by clutches.

The pick-up roller and the separation pad pick up one sheet of copy paper, and send it to the registration roller.

The foregoing series of operations is executed for each pick-up.

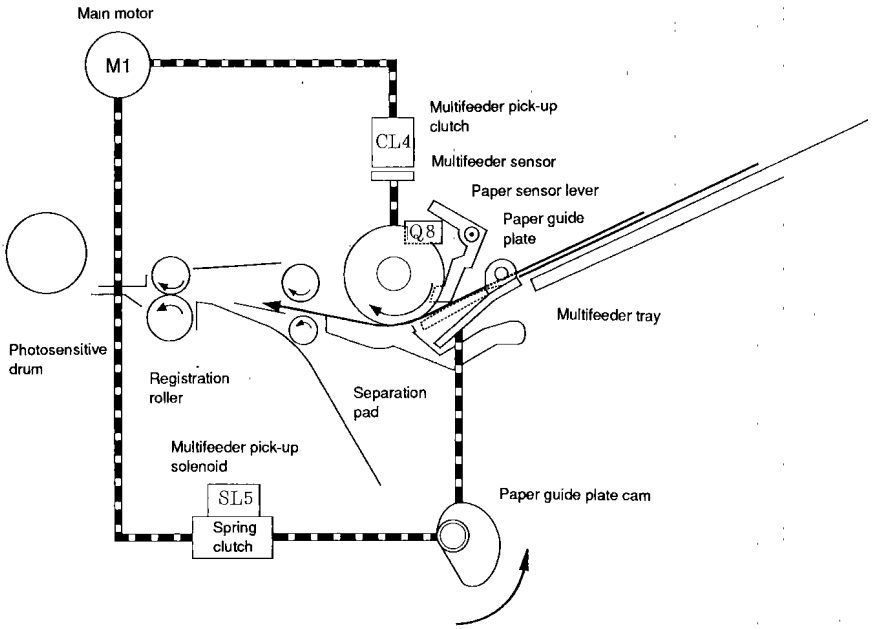

Figure 3-39a

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b. Sequence of Operations (pick-up from multifeeder)

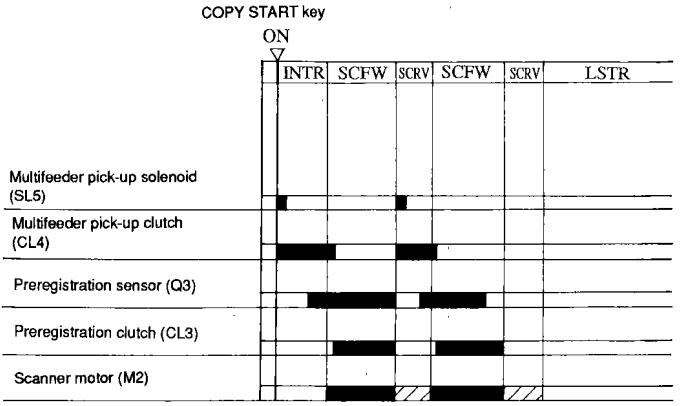

Figure 3-39b

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B. Identifying the Cassette Size

The presence/absence of a cassette in the cassette holder and the size thereof are identified by four switches (CST1 through CST4) provided in each cassette holder.

Based on the combinations of the switches which have been actuated, the microprocessor recognizes the presence/absence of a cassette as shown in Table 3-4 and, at the same time, determines where to reverse the scanner and how to control the blank shutter.

Arrangement / Cassette size	SW 701 (left)	SW 702	SW 703	SW 704 (right)
No cassette	0	0	0	0
B5 (182X257)	0	0	0	1
U2 (See Note.)	0	0	1	0
A4 (210X297)	0	0	1	1
B5R (257X182)	0	1	0	0
B4 (364X257)	0	1	0	1
A4R (297X210)	0	1	1	0
A3 (420X297)	0	1	1	1
U1 (See Note.)	1	0	0	0
U1 (See Note.)	1	0	0	1
U2 (See Note.)	1	0	1	0
Letter 8.5"X11" (216X279)	1	0	1	1
Mini 5.5"X8.5" (216X140)	1	1	0	0
Legal 8.5"X14" (356X216)	1	1	0	1
Letter R 8.5"X11" (279X216)	1	1	1	0
Ledger R 11"X17" (432X279)	1	1	1	1

0: SW is OFF.
1: SW is ON.

Note:
UL1: Argentine-LTR
Government-LTR
Korean Government
UL2: Argentine-LGL
Government-LGL
Argentine-LTR-R
Government-LTR-R
Foolscap
Folio
Australian Foolscap
Korean Government-R
OFICIO
Equadoran OFICIO
Bolivian OFCIO

(unit: mm)

Table 3-4

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C. Fixing Assembly and Delivery Assembly

1. Controlling the Fixing Roller Temperature

The upper and lower rollers of the fixing assembly and the delivery roller of the delivery assembly are driven by the main motor (M1).

The upper roller has a built-in heater (H1, 90 W), which heats the roller.

The DC controller monitors the surface temperature of the upper roller by a thermistor (TH) to make sure that it will remain as specified.

The specifics of the control are as follows:

a. NP2020

① when the black developing assembly is used,
control temperature
(standby/copying) ..... 170°C
control temperature (pre-heat) ..... 140°

② when the CT unit is used,
control temperature (standby/copying) ... 150°C
control temperature (pre-heat) ..... 140°

b. NP2120

① when the black developing assembly is used,
control temperature (standby/
copying/ preheat) ..... 155°C

② when the CT unit is used,
control temperature (standby/pre-heat) ... 150°C
control temperature (copying) ..... 165°

To prevent lowering of the surface temperate of the upper roller during continuous copying, the control is switched as follows when copying lasts about 15 seconds.

a. NP2020

① when the black developing assembly is used,
- If small-size paper is used, 170°C is switched to 175°C control
- If large-size paper is used, 170°C is switched to 185°C control

② when the CT unit is used,
- If small-size paper is used, 150°C is switched to 155°C control
- If large-size paper is used, 150°C is switched to 165°C control

Note:
Small-size papers include A4, B5, LTR, and A4R.
Large-size papers include A3, B4, 11"×17", LGL

b. NP2120

① when the black developing assembly is used and pick-up is from the cassette,
- If A4, B4, A3, LTR, or 11"×17" is used, 170°C is switched to 185°C control; otherwise, 170°C is switched to 175°C

② when the black developing assembly is used and pick-up is from the multifeeder,
- If A4R or longer paper is used, 170°C is switched to 185°C control; otherwise, if paper shorter than A4R is used, 170°C is switched to 175°C control

③ when the CT unit is used and pick-up is from the cassette,
- If A4, B4, A3, LTR, or 11"×17" is used, 155°C is switched to 170°C control; otherwise, 150°C is switched to 160°C

④ when the CT unit is used and pick-up is from the multifeeder,
- If A4R or longer paper is used, 165°C is switched to 175°C control; otherwise, if paper shorter than A4R is used, 165°C control is used as is

The copier is equipped with the following four types (or three types if NP2020) of protection mechanism to prevent the fixing heater from going ON at the wrong timing.
- The microprocessor monitors the voltage of TH1; when it finds an error, it issues E000 or E000. (See the SERVICE HANDBOOK.)
- If the voltage of TH1 lowers to about 1.0 V or lower (220°C equivalent), the error detection circuit cuts off the power to the fixing heater regardless of the output of the microprocessor. (See p. 3-57.)
- If the temperature of the thermoswitch exceeds 230°C, the thermoswitch goes OFF to cut off the power to the fixing heater.
- If the SSR ON detection PCB detects the activation of the SSR, it sends the SSR ON signal to the DC controller PCB. In response, the DC controller PCB compares the output timing of the HTRD signal and the SSR ON timing, issuing E004 upon identification of an error (applies to NP2120 only; see the SERVICE HANDBOOK).

Note:
Do not use the thermal switch (TS) once it has opened; it cannot serve its purpose unless cooled to 0°C or less, not returning to normal at ambient temperature.

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2. Oil Application Roller

The upper fixing roller is provided with an oil application roller for cleaning and application of oil. Normally, the oil application roller remains away from the fixing roller, and it comes into contact with the upper fixing roller only when copy paper passes through.

The mechanism is driven by the oil application roller solenoid (SL3); SL3 goes ON as soon as copy paper reaches the separation sensor (Q5), thereby bringing the oil application roller into contact with the upper fixing roller.

SL3 remains ON for about 4 seconds as timed by the microprocessor; however, it goes OFF as soon as the main motor stops if the copy paper is delivered within 4 seconds.

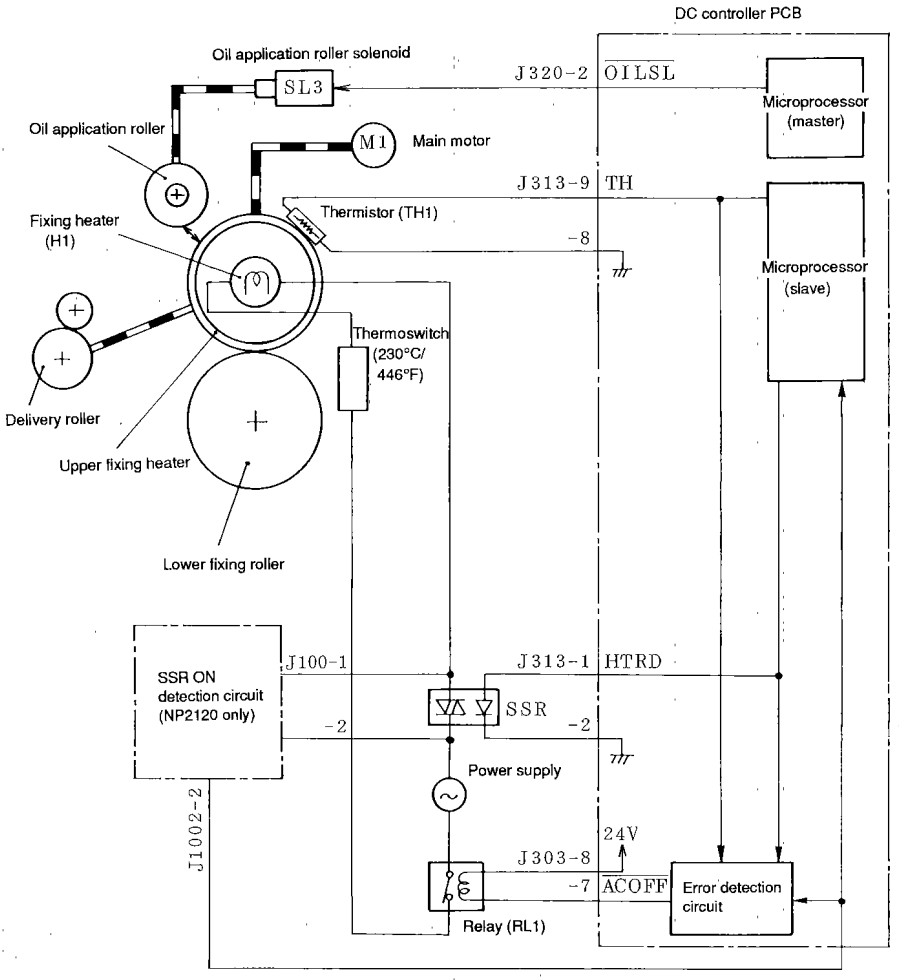

Figure 3-43

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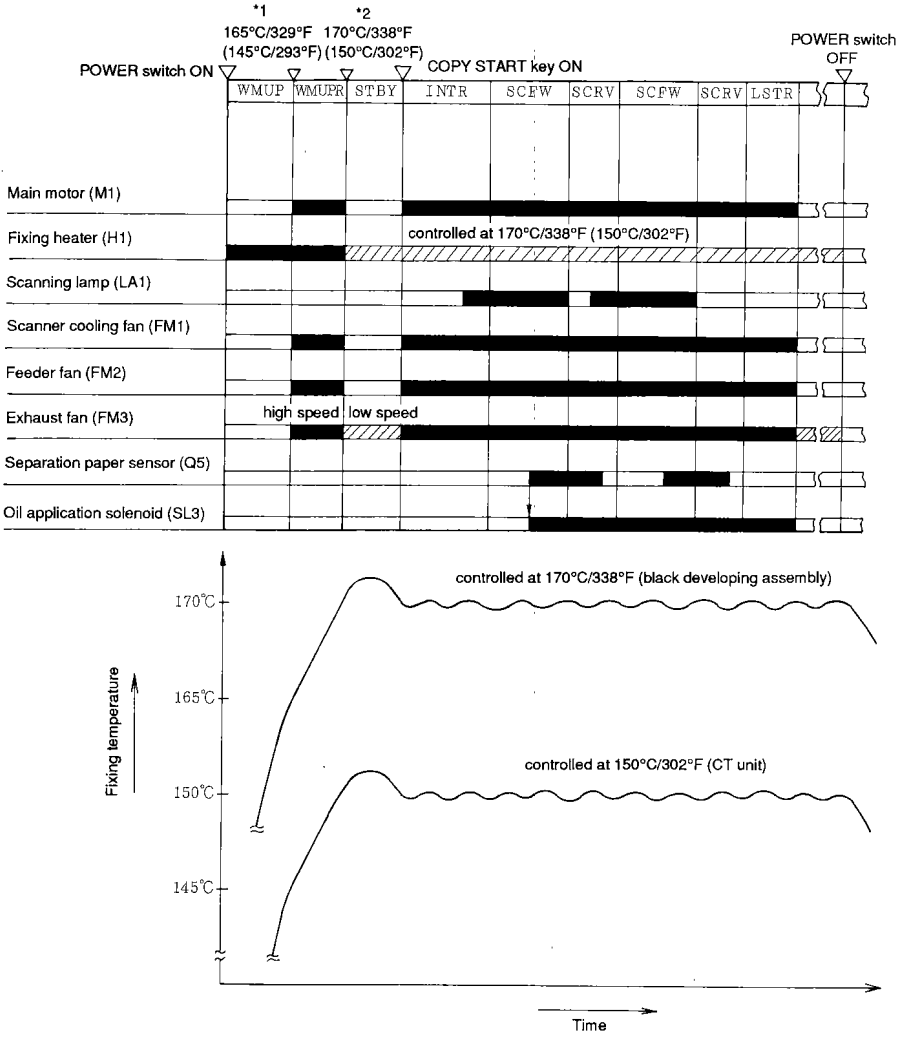

Figure 3-44

When the copier enters the pre-heat mode in response to a press on the PREHEAT key, the temperature of the fixing assembly is controlled to 140°C regardless of whether the black developing assembly or CT unit is used. However, in the case of the NP2120, the temperature is controlled as in the standby period.

*1 140°C; if NP2120, 160°C.

*2 155°C; if NP2120, 170°C.

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D. Error Detection Circuit (NP2020)

The error detection circuit is found on the DC controller PCB and serves to monitor the fixing temperature and scanning lamp; i.e., abnormal rises in the former, and timing of activation of the latter.

If any of the above conditions occurs, the output of the circuit causes the relay (RL1) to go OFF, thereby cutting the supply power (AC) to the fixing heater and lamp regulator.

2. Mechanism

When the voltage of the thermistor reaches about 1.0 V because of a rise in the temperature of the fixing roller, the output of the No. 1 comparator of Q309 goes '0'.

The lamp regulator generates LIGHT=1 (scanning lamp ON signal) at all times as long as the scanning lamp is ON.

The above conditions cause the No. 2 comparator of Q309 to generate '1', thereby charging the capacitor (C333).

C333 becomes fully charged about 20 seconds thereafter; and output '1' of the No. 2 comparator is sent to the negative (-) input side of the No. 3 comparator. As a result, the output of the No. 3 comparator of Q309 goes '0'.

The above conditions generate $\overline{ACOFF}$=0, thereby causing the relay (RL1) to go OFF.

The copier can be reset after activation of the error detection circuit by turning it OFF and then ON.

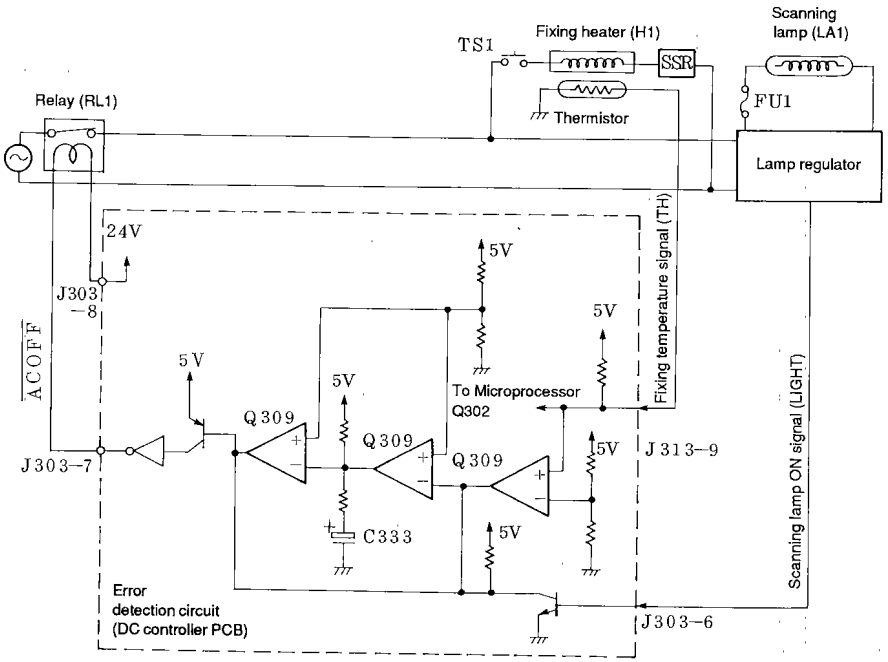

Figure 3-45

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E. Error Detection Circuit (NP2120)

1. Outline

The error detection circuit is built into the DC controller, and is used to monitor the surface temperature of the upper fixing roller, the condition of the fixing heater, and the condition of the scanning lamp.

The signals (LIGHT, SSRON, HTRD, TH) shown in Figure 3-45a are input signals to the error detection circuit.

An error in these signals causes the error detection circuit to issue the ACOFF signal, thereby activating the AC shutoff relay (RL1).

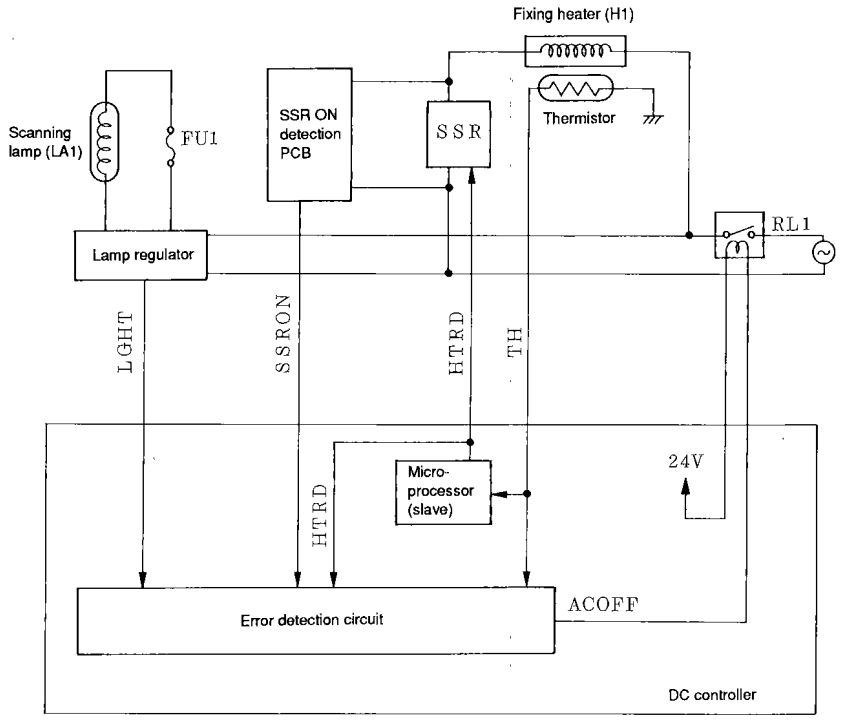

Figure 3-45a

2. Mechanism

Figure 3-45a shows the error detection circuit, and Table 3-5 lists the conditions for its activation.

The error AC shutoff relay (RL1) goes OFF in response to the output of the error detection circuit in terms of both software and hardware.

a. Detection by Software

If an error in the surface temperature of the upper fixing roller (220°C) or the activation of the fixing heater is detected in terms of software, the error AC shutoff relay (RL1) is turned OFF immediately and an error code is displayed.

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b. Detection by Hardware

If the software detection mechanism fails to function, the error AC shutoff relay (RL1) is turned OFF under the following three conditions (A, B, C).

Ⓐ the scanning lamp ON detection signal (LGHT) learns that the scanning lamp remained ON continuously (about 20 sec).

Ⓑ the SSR ON signal (SSR ON) identifies the activation of the heater despite the absence of the heater drive signal (HTRD) generated by the microprocessor.

Ⓒ the fixing temperature detection signal (TH) identifies overheating (about 230°C) of the thermistor.

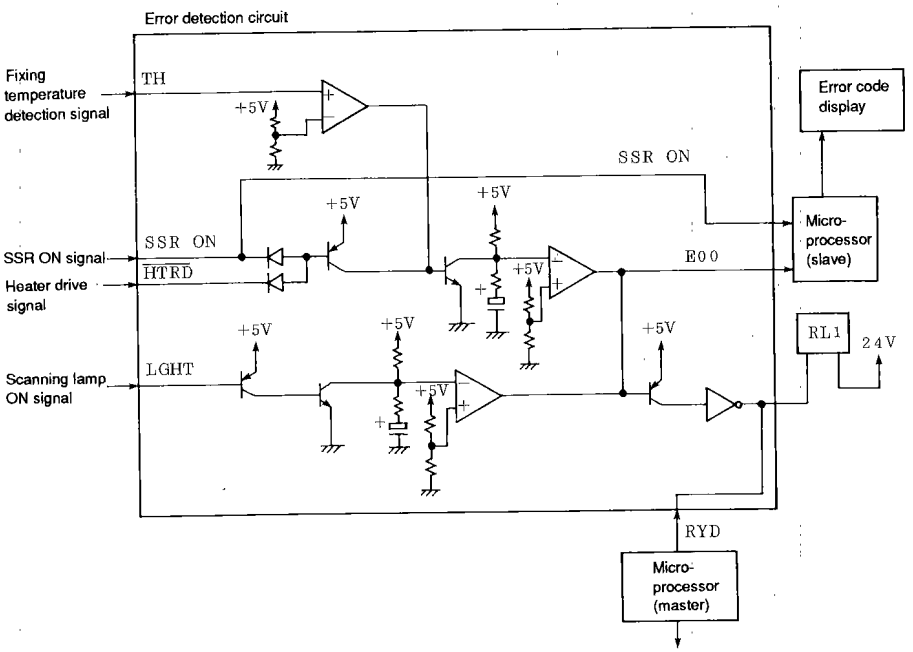

Figure 3-45b

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Error Code

E001 ··· When the output of the fixing temperature detection signal (TH) exceeds 230°C, the error detection circuit issues E00 to the microprocessor. In response, the microprocessor displays E001. If E004 has been identified in advance, the microprocessor displays E004 instead.

E004 ··· The heater drive signal (HTRD) is not generated for 3 seconds after power-on.
E004 is issued if the SSR ON is issued to the DC controller during the absence of the heater drive signal.
E004 is also issued when the DC controller identifies the SSR ON signal for 3 seconds or more in the absence of the heater drive signal.

Any of the above conditions causes its respective error code to be displayed on the control panel; see Table 3-5.

Condition	Error Code
Ⓐ	E221
Ⓑ	E001
Ⓒ	E001

Table 3-5

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F. Jam Detection

The copier monitors the movement of copy paper using the following three sensors:

- Pre-registration sensor (Q3)
- Separation sensor (Q5)
- Delivery sensor (SW8)

Jams are identified in terms of the presence/absence of paper at respective sensors at such times as programmed in the microprocessor in advance.

The copier has mechanisms that remember the "remaining number of copies" and the "copy modes" in response to a jam, and such data are retained for about ten minutes after the front cover is opened, cutting out the power.

The microprocessor holds the following five jam detection sequences and, further, it identifies a jam if paper is detected at time of power-on.

When the copier identifies a jam, it immediately stops operation and cuts out power to the fixing heater (H1); at the same time, it flashes the 'JAM' indicator on the control panel, indicating the location of the jam.

No count is taken for jams which activate these mechanisms.

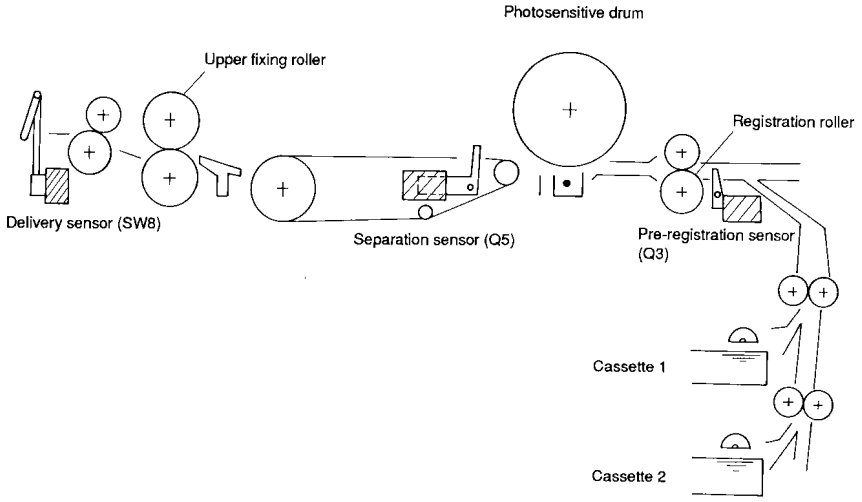

Figure 3-46

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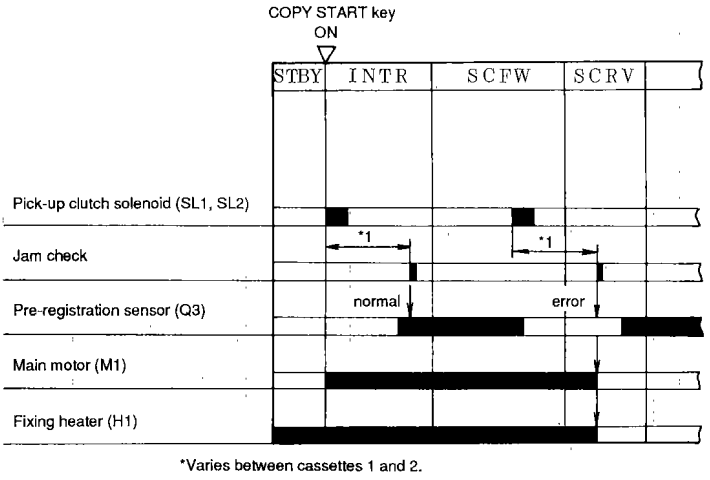
① Pick-Up Delay Jam

The microprocessor identifies a pick-up delay jam if the paper fails to reach the pre-registration sensor (Q3) within a specific time after pick-up operation.



*Varies between cassettes 1 and 2.

Figure 3-47

② Separation Delay Jam

The microprocessor identifies a separation delay jam if the paper fails reach the separation sensor (Q5) within a specific time after the registration clutch (CL3) goes ON.

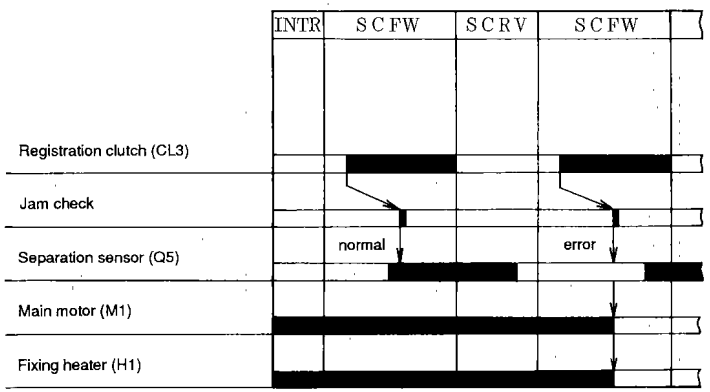


Figure 3-48

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③ Separation Stationary Jam

The microprocessor identifies a separation stationary jam if the paper fails to move past the separation sensor within a specific time after the separation sensor (Q5) detects the paper.

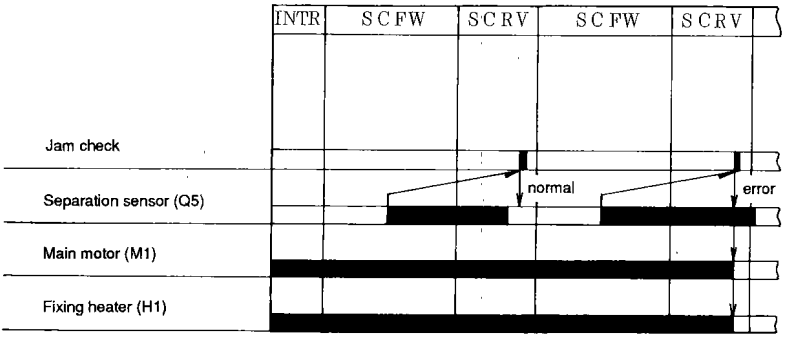

Figure 3-49

④ Delivery Delay Jam

The microprocessor identifies a delivery delay jam if the paper fails to reach the delivery sensor within a specific time after the separation sensor (Q5) detects the paper.

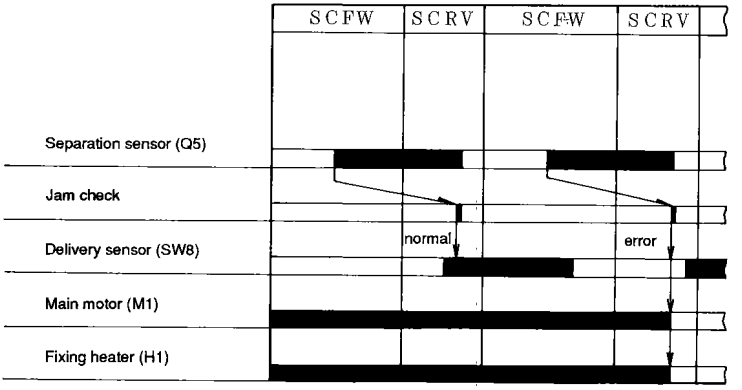

Figure 3-50

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⑤ Delivery Stationary Jam

The microprocessor identifies a delivery stationary jam if the paper fails to move past the delivery sensor within a specific time after the delivery sensor (SW8) detects the paper.

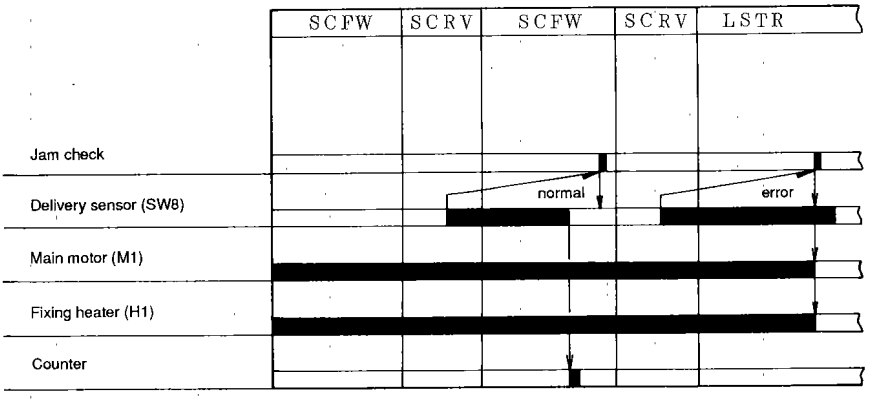

Figure 3-51

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V. POWER SUPPLY

A. DC Power Supply

1. Mechanism

The DC power supply PCB is supplied with AC power when the door switch and POWER switch are turned ON.

On the DC power supply PCB, the AC power is rectified and smoothed out. Its voltage then is lowered by the transformer (T201); thereafter, it is made available in 24V, 12V, and 5V by filters and regulator.

For 24V power, the output voltage is checked; it is fed back to the switching regulator (Q204) by way of a photocoupler (Q205) for stabilization.

5V power is stabilized by the regulator (Q207).

2. Protection Mechanism for Power Supply Circuit

The DC power supply is equipped with protection mechanisms to cut off the power should any of the loads suffer a short because of an error.

The protection mechanism for 24V power is the over-current detection mechanism in the switching regulator (Q204); upon activation, the circuit also cuts off 12V and 5V outputs. For 12V power, a current fuse serves to protect against an over-current.

The protection mechanism for 5V power makes use of the over-current detection circuit of the regulator (Q207); upon activation, the output of only 5V is cut off.

For 24V power, an over-voltage protection circuit is additionally provided using a Zener diode (ZD201) and thyristor (Q208).

The output, after activation of these protection mechanisms, can be recovered by turning the door switch OFF, correcting the relevant load, and turning the door switch ON once again.

If only 12V has been cut out, the door switch should be turned OFF, the relevant load should be corrected, fuse (FU202) should be replaced, and the door switch should be turned ON once again.

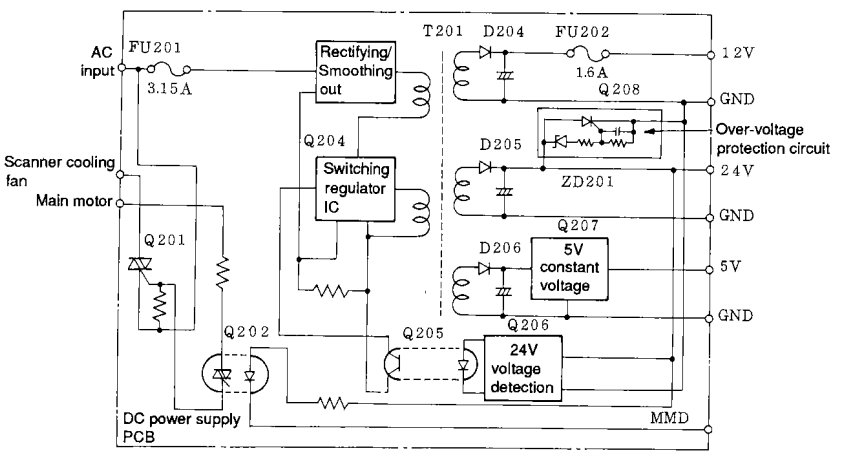

Figure 3-52

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B. DC Power Supply for Options

1. Mechanism

The DC power supply for options supplies the document feeder and sorter with 24V power.

The transformer (T101) lowers the voltage of the 130 VDC from the copier and filters it to produce an output of 24 V. The output voltage is then checked and fed back to the switching regulator (Q101) by way of a photocoupler (Q102) for stabilization.

2. Protection Mechanism

The protection mechanism of the DC power supply for options makes use of the over-current protection circuit inside the switching regulator (Q101).

It is also equipped with an over-voltage protection circuit identical with that for the DC power supply of the copier itself.

The output, after activation of the protection mechanism, can be returned by turning off the power, correcting the relevant load of the option, and turning the power ON once again.

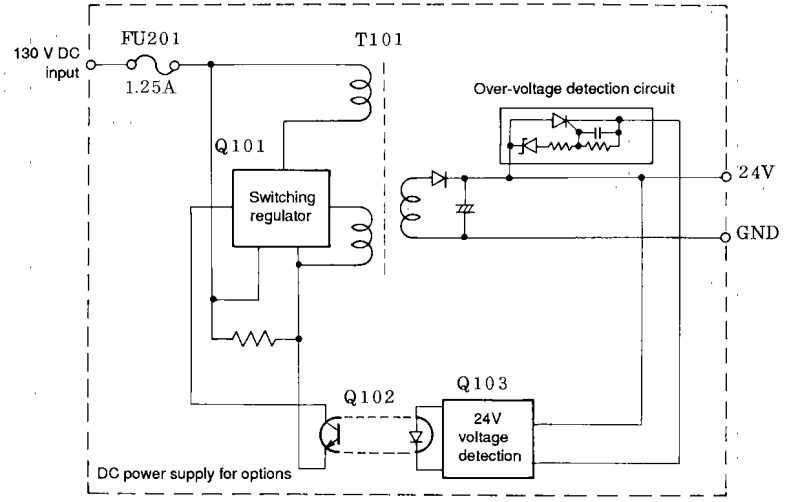

Figure 3-53

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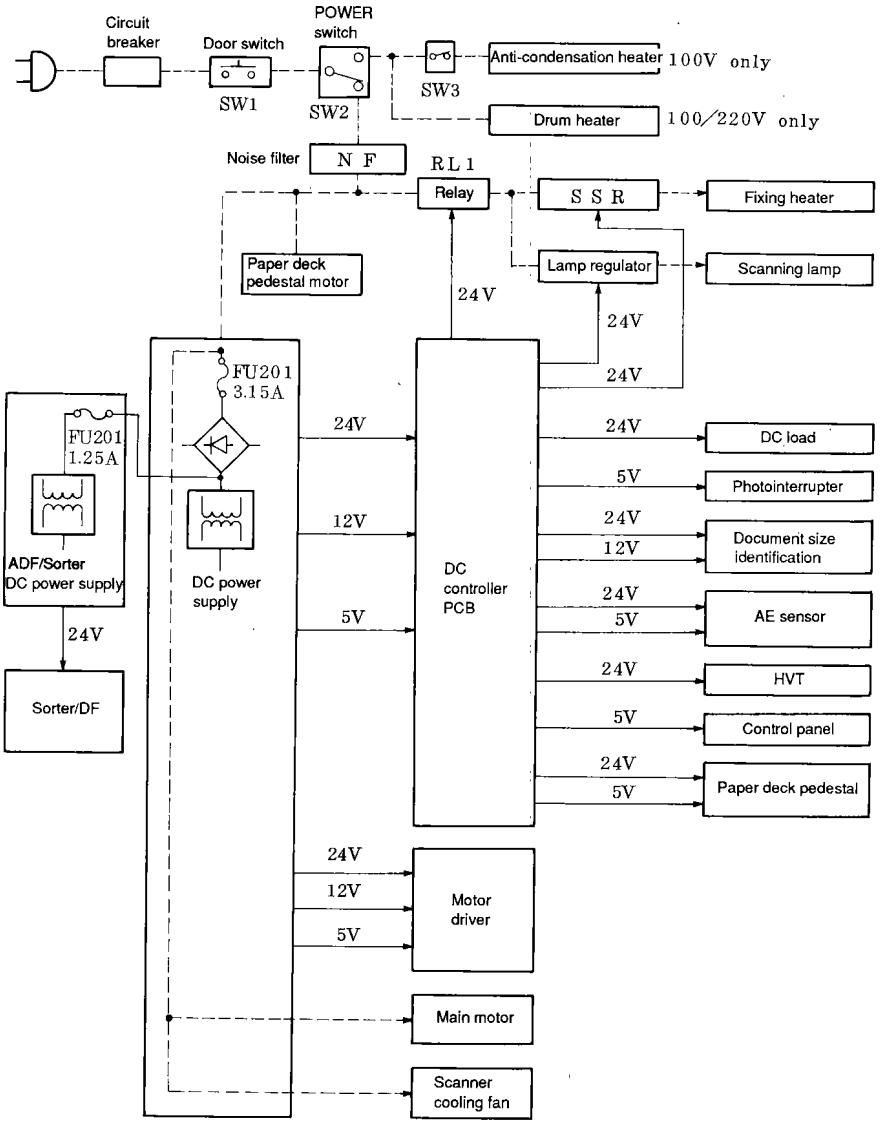

Figure 3-54

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VI. SERVICE MODES

A. Outline

The service modes are available for use in adjusting and checking some of the sensors and loads and can be activated by pressing the service switch (SW1) on the adjustment PCB. See the table below for descriptions on each of the seven service modes.

Service mode No.	Description	Adjustment/Checks
0	The scanner moves forward to the point of AE measurement, and the scanning lamp goes ON; the output voltage of the AE sensor is indicated on the copy counter on the control panel. EX. 15 ⇨ 1.5V	Use it to adjust the AE reference point; for details, see p. 3-34.
1	The read-in voltage of VR2 (AE slope adjustment) is indicated on the copy counter on the control panel. EX. 22 ⇨ 2.2V	Use it to adjust the AE slope; for details, see p. 3-35.
2	The power frequency data is indicated on the copy counter on the control panel. EX. –05 ⇨ 59.5Hz	The copier uses an AC motor; the variation in its rotation speed caused by fluctuations in the frequency can bring about expansion/contraction of the image; use it to check such problems.
3	The pre-exposure lamp and main motor are driven.	Use it to check the operation of the lamp and motor.
4	All LEDs on the control panel go ON.	Use it to check the LEDs.
5	The output voltage of 'document size 0' is indicated on the copy counter on the control panel. EX. 18 ⇨ 1.8V	If any of the following is true, an error should be suspected; replace the document size detection mechanism (no adjustment is possible in the field). • The value indicated with the copyboard cover closed is 20 or less. • The value indicated with the copyboard cover open is 30 or more.
6	The output voltage of 'document size 1' is indicated on the copy counter on the control panel. EX. 18 ⇨ 1.8V	
7	The output voltage of 'document size 2' is indicated on the copy counter on the control panel. EX. 18 ⇨ 1.8V	

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B. Using the Service Mode

1) Remove the adjustment cover found below the left cover (rear).

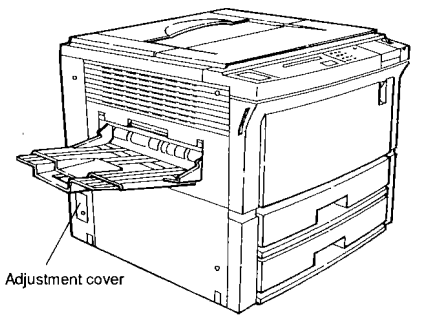

Figure 3-55

2) Check that the COPY START key is green.
3) Press the service switch (SW) on the adjustment PCB.

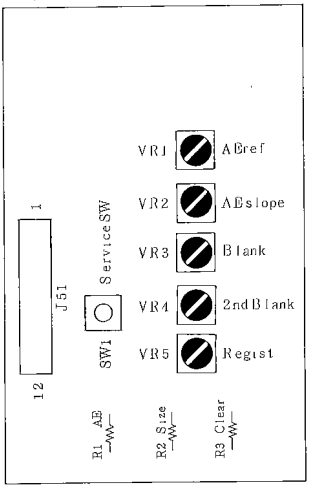

Figure 3-56

4) Enter the No. of the desired service mode using the tenkey pad on the control panel.
   - EX.: If '0' is entered, the indicator indicates '0'.
5) Press the SORT/GROUP key on the control panel; this activates the service mode.
6) Press the SORT/GROUP key once again to stop execution of the service mode.
7) Press the service switch (SW1) on the adjustment PCB to leave the service mode.
   - The copier may also be turned OFF to leave the service mode.
8) Attach the adjustment cover.

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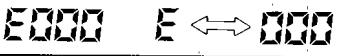
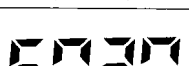
VII. SELF DIAGNOSTIC MECHANISM

The copier's microprocessor is equipped with a mechanism to check its condition (sensors, in particular). The microprocessor monitors the operation of the copier as necessary and, if it finds an error, it indicates an error code on the copy counter on the control panel.

See the table below for descriptions of each of the error codes; for E000, 'E' and '000' are flashed alternately.



Error code	Cause	Description
	• Thermistor (TH1; poor contact or open circuit) • Heater (H1; open circuit) • Thermoswitch (TS1; faulty) • SSR (faulty) • DC controller PCB (faulty)	The output of TH1 fails to reach 100°C/212°F within 1 min after power-on.
	• Thermistor (TH1; short circuit) • SSR (faulty) • DC controller PCB (faulty)	The output of TH1 exceeds 220°C/428°F.
(NP2120)	• SSR (faulty) • DC controller PCB (faulty) • Fixing heater (open circuit)	• SSR ON is detected while HTRD is OFF immediately after power-on (about 3 sec). • SSR ON is detected continuously for 3 sec or more while HTRD is OFF.
	• Counter (CNT1; open circuit) • DC controller PCB (faulty)	• Normal if the check signal is '0' immediately before the counter goes ON, when the COPY START key is pressed, or at power-on.
	• Scanner motor (M2; faulty) • DC controller PCB (faulty) • Scanner home position sensor (Q4; faulty)	• The scanner initial operation is not over within 15 sec at power-on. • The AE reverse operation is not over within 15 sec. • The reverse operation is not over within 10 sec after exposure. All keys on the control panel will be locked without error code indication.
	• Lens home position sensor (Q1; faulty) • Lens motor (M3; faulty) • Lens wire (faulty) • DC controller PCB (faulty) • Blank shutter home position sensor (Q2; faulty) • Blank shutter drive wire (faulty)	• The lens is not set to the DIRECT position within 20 sec after initial rotation is started. • The lens is not set to the specified reproduction ratio position within 20 sec after the COPY START key is pressed. • The blank shutter home position sensor (Q2) does not detect the blank shutter within 20 sec after the commencement of initial rotation or after the COPY SART key has been pressed.
	• Lamp regulator (faulty) • DC controller (faulty)	The zero cross signal (ZXDP) has fluctuated.

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Error code	Cause	Description
	• ADF controller (faulty) • ADF power supply (faulty) • ADF sensors (faulty) • DC controller (faulty)	• An error in communication with the ADF cannot be cleared. • The sensor output within the ADF has an error. (If the ADF is faulty, only 'E400' goes ON; therefore, check the communication line and sensors and motor in the ADF.)
	• Sorter controller (faulty) • DC controller (faulty)	An error in communication with the sorter cannot be cleared.
	• DC controller PCB (faulty) • Connector (w/ option; poor contact)	The IPC (Q304) cannot be initialized at time of power-on.

Note:
The copier can be reset by turning it OFF and then ON when its self diagnostic mechanism has been activated. If 'E000' is indicated, however, the copier cannot be reset this way. This is a consideration against damage to the fixing roller from over-heating when the thermistor fails to serve its purpose.
To clear 'E000', perform the following:
1) Remove the adjustment cover.
2) Turn the power OFF.
3) Press the service switch (SW1, on the adjustment PCB.
4) Turn the power OFF and ON.

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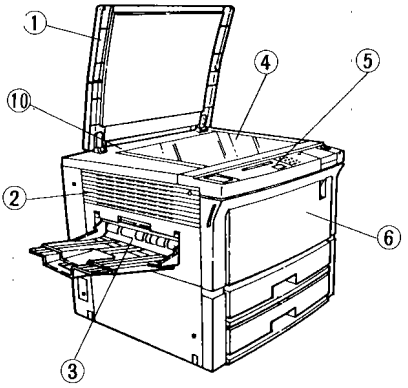
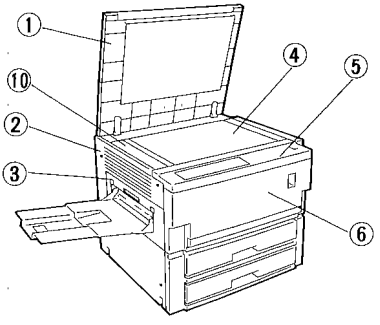
I. EXTERNALS

A. External Covers

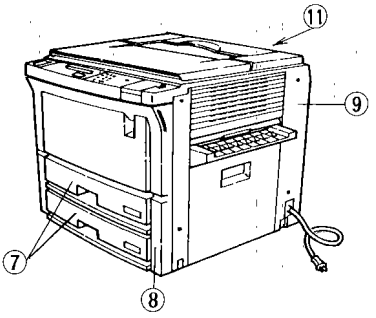


NP2020

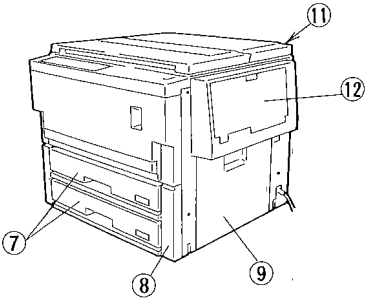


NP2120

Figure 4-1



NP2020



NP2120

① Copyboard cover	⑦ Cassettes
② Left cover	⑧ Lower front cover
③ Delivery cover	⑨ Right cover
④ Copyboard glass	⑩ Upper rear cover
⑤ Control panel	⑪ Rear cover
⑥ Front door	⑫ Multifeeder

Figure 4-2

Remove the covers as necessary for cleaning, inspecting, or repairing the inside of the copier.

Covers that can be detached by mere removal of the screws are left out of the procedure.

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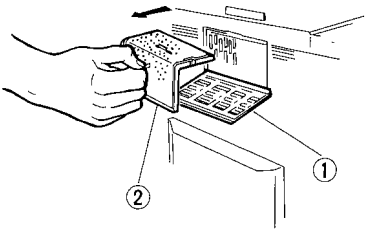
Note:
Make sure that the copier is closed before removing the copyboard glass. Use an alcohol solution to clean the copyboard glass; the use of a solvent can corrode the white paint along the right edge of the glass.

1. Rear Cover

1) Remove the air filter.



① Air filter cover
② Air filter

Figure 4-3

2) Remove the four mounting screws.
3) Move the rear cover down until the four hooks are disengaged; thereafter, move it up to remove.

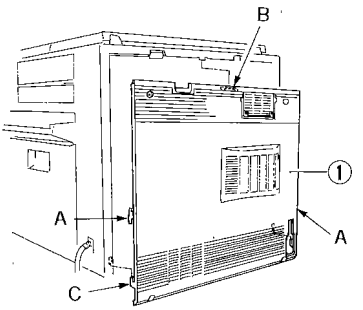


Figure 4-4

• Hook in A

• Hook in C

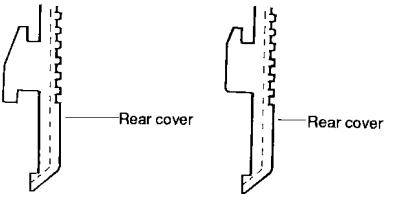


Figure 4-5

• Hook in B

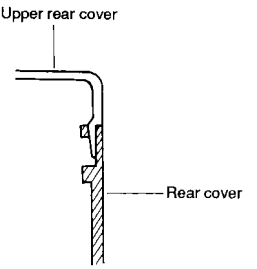


Figure 4-6

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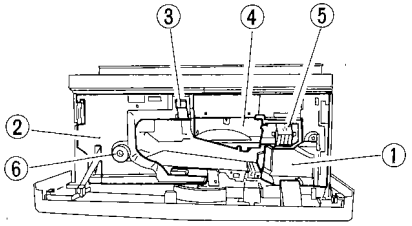
2. Inside Covers (left, right)

1) Remove the inside cover (fixing assembly knob; left); be sure to remove the ozone filter holder in advance.
2) Remove the inside cover (right); be sure to remove the drum unit and developing assembly in advance.

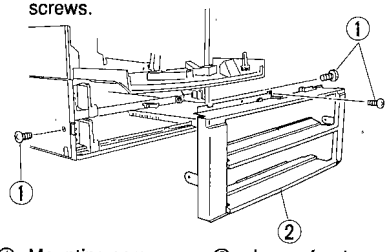


① Inside cover (right)
② Inside cover (left)
③ Ozone filter holder
④ Drum unit
⑤ Developing assembly
⑥ Fixing assembly knob

Figure 4-7

3. Lower Front Cover

1) Remove the lower front cover; three mounting screws.

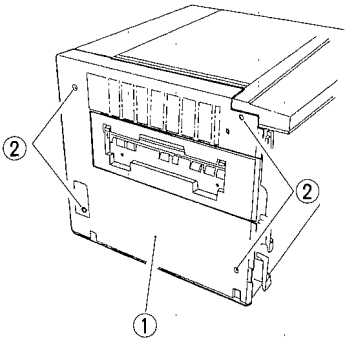


① Mounting screws
② Lower front cover

Figure 4-8

4. Left Cover

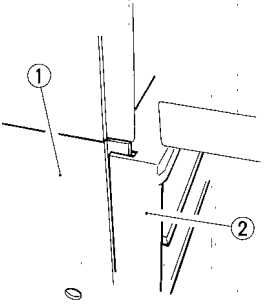
1) Remove the rear cover.
2) Remove the four mounting screws.



① Left cover
② Mounting screws

Figure 4-9

3) Detach the left cover from the lower front cover.



① Left cover
② Lower front cover

Figure 4-10

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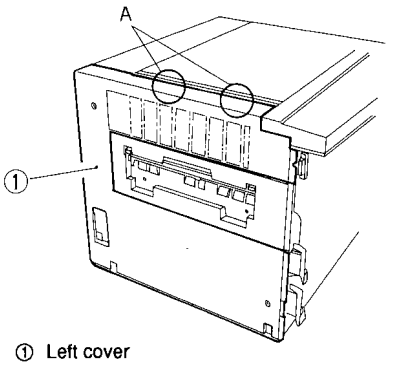
4) Move the left cover up to remove.



① Left cover

Figure 4-11

• Cross Section of A

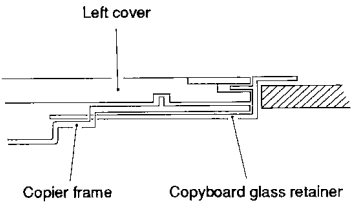
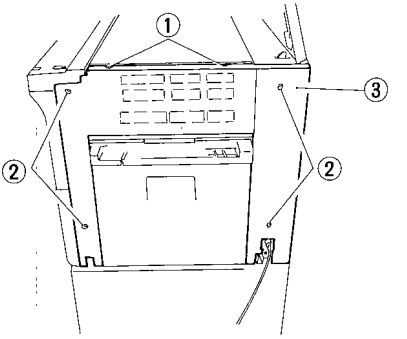


Figure 4-12

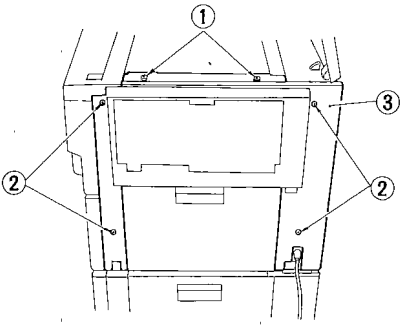
Note:
If a sorter (sorter-A1) is attached, pull up the left cover to remove.

5. Right Cover

1) Remove the rear cover.
2) Loosen the two mounting screws of the copyboard glass retainer, and remove the four mounting screws of the right cover.



NP2020



NP2120

① Mounting screws (copyboard glass retainer)
② Mounting screws (right cover)
③ Right cover

Figure 4-13

3) Open the front right door

4) Open the right door to remove; be careful with the lower front cover.

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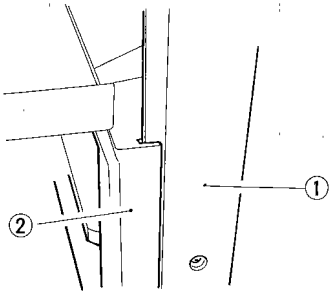
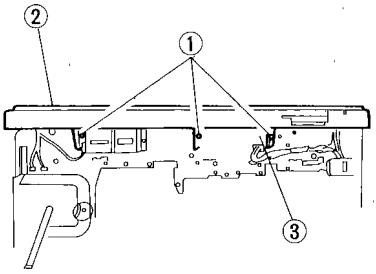


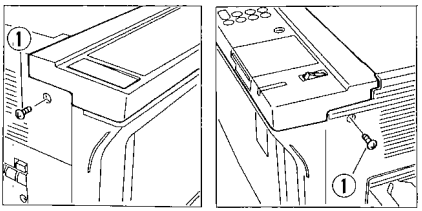
① Right cover ③ Engagement
② Lower front cover

Figure 4-14

B. Control Panel

1) Remove the inside cover.
2) Remove the five mounting screws and grounding wire, and pull the control panel up to remove.





① Mounting screw ③ Grounding wire
② Control panel

Figure 4-15

C. Copyboard Cover

1. Replacing the Contact Sheet

The contact sheet is attached to the copyboard retaining plate using tape; pull on its corners to remove.

After attaching a new sheet, press over the sheet to even it out.

D. Fans

1. Outline

The copier is equipped with three fan motors which serve to circulate the air inside the machine. Each of these fans serves the following purpose:

- Scanner cooling fan (FM1): cools the scanner;
- Feeder fan (FM2): moves copy paper;
- Exhaust fan (FM3): directs the air to the outside of the copier.

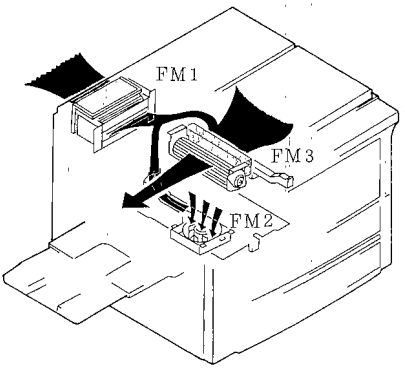


Figure 4-16

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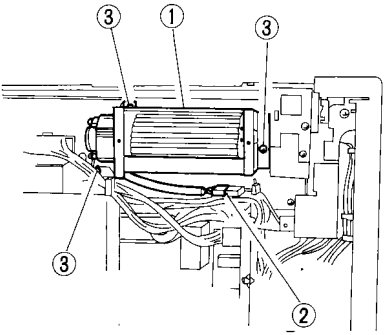
2. Scanner Cooling Fan

1) Remove the rear cover.
2) Disconnect the connector (J63).
3) Remove the three mounting screws, and remove the fan.

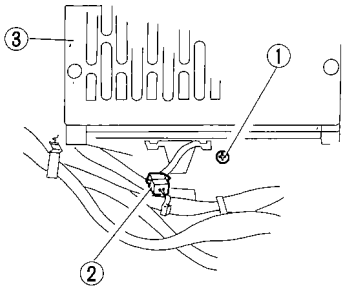


① Scanner cooling fan
② Connector (J63)
③ Mounting screws

Figure 4-17

3. Exhaust Fan

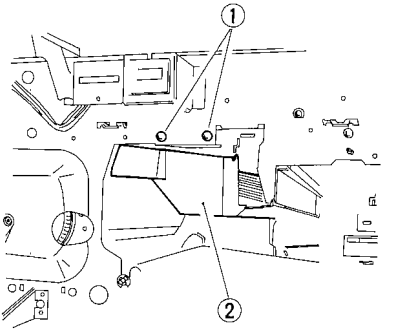
1) Remove the rear cover.
2) Disconnect the connector (J37), and remove the mounting screw.



① Mounting screw ③ Scanner cooling fan
② Connector (J37)

Figure 4-18

3) Open the front door, and remove the ozone filter and inside cover (left).; thereafter, lower the feed unit.
4) Put a hand under the exhaust fan unit, remove the two mounting screws, and pull it out to the front with care.



① Mounting screws ② Exhaust fan

Figure 4-19

4. Feeder Fan

To remove the feeder fan, see p. 4-17.

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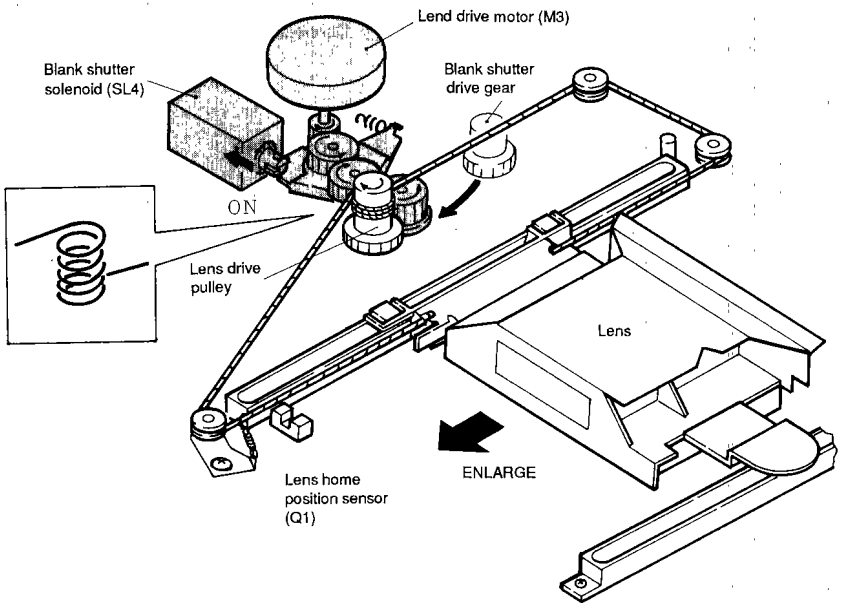
II. DRIVE SYSTEM

A. Lens Drive Unit

1. Outline

The lens drive system serves to drive both the lens and blank exposure shutter; the drive is switched by the blank shutter solenoid (SL4).



: lens dive unit is shown as shaded.

Figure 4-20

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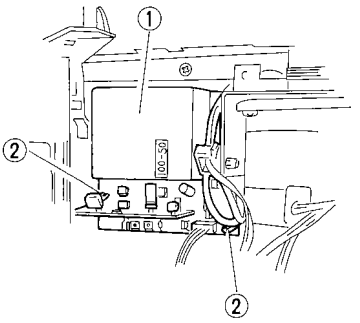
2. Lens Drive Unit

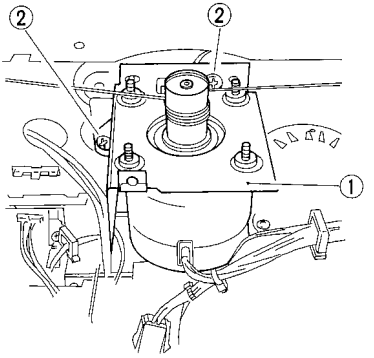
1) Remove the lamp regulator.



① Lamp regulator
② Locking supports

Figure 4-21

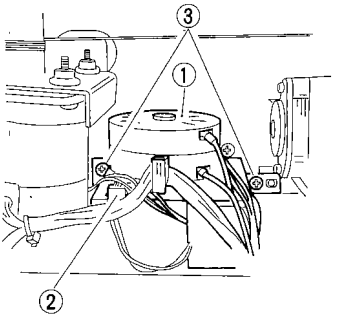
2) Remove the four mounting screws of the scanner motor; take care to keep the scanner drive cable intact.



① Scanner motor
② Mounting screws

Figure 4-22

3) Slide the scanner motor somewhat, remove the two mounting screws, disconnect the connector, and remove the lens drive unit.



① Lens drive unit
② Connector
③ Mounting screws

Figure 4-23

3. Lens Cable

Route the lens cable as shown in Figure 4-20.

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B. Scanner Drive Unit

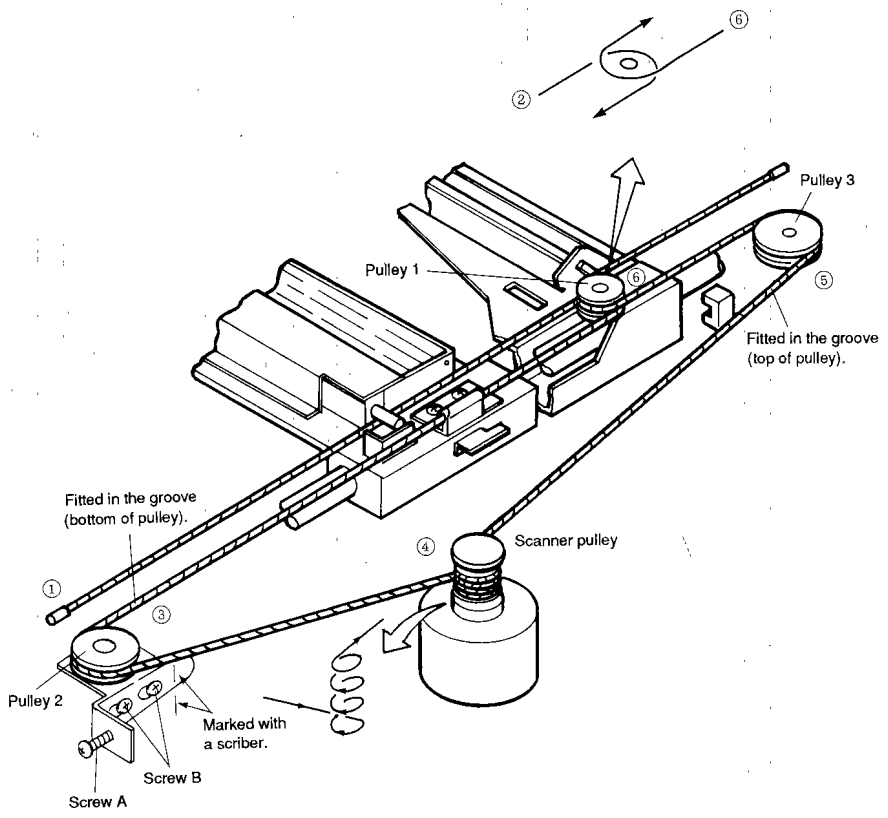

Figure 4-24

1. Detaching the Scanner Cable

1) Mark the position of the fixing plate using a scriber, and loosen two screws B, which hold the fixing plate in place.
2) Loosen screw A, and detach the scanner cable.

2. Attaching the Scanner Cable

1) Route the cable as shown in Figure 4-24.
2) Turn screw A to adjust the position of the fixing plate; align it with the line drawn using a scriber.
3) Tighten screw B.

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3. Adjusting the Scanner Driver Cable

Move the No. 1 mirror mount to the home (start) position, pull the cable using a spring gauge (A in Figure 4-25), and turn screw A so that the reading of the gauge is about 1.0 ±0.05 kg.

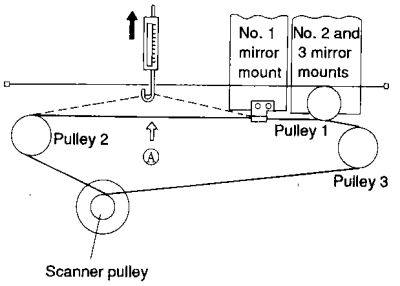

Figure 4-25 (viewed from above)

4. Adjusting the Mirror Position (optical length between No. 1 and 2 Mirrors)

Adjust the relative position of the mirrors when the mirror drive cable has been re-routed.

The position can be adjusted by moving the fixing used for the No. 1 mirror mount; loosen the hex screw.

Note:

i. The cable tends to become slack as copies are made, necessitating adjustment of its tension.

ii. If the optical distance between the No. 1 and 2 mirrors is not correct, the horizontal reproduction ratio will not be correct and, at the same time, images will be out of focus.

1) Draw lines on copy paper (A4, A3, LTR, or 11" × 17"); 1 cm/0.4 inch from each end as shown in Figure 4-26.

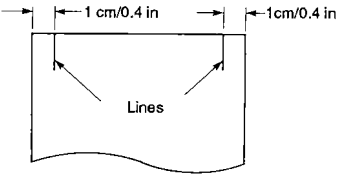

Figure 4-26

2) Use the paper marked with lines as the document, and make a copy; A.
3) Place a blank sheet of paper on the copyboard, and feed the paper marked with lines in the manual mode; B.

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■ The paper paper will show contraction caused by heat after it has gone through the copier.

4) Place paper A and paper B together aligned over the left lines, and adjust the No. 1 mirror mount so that distances x and y in Figure 4-27 are equal.

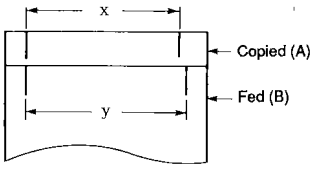
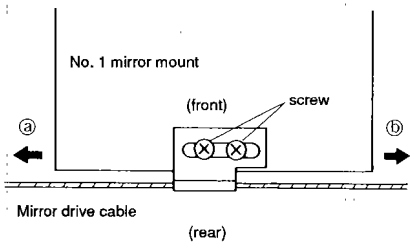


Figure 4-27

x=y Correct.
x>y Move the No. 1 mirror mount in the direction of a.
x<y Move the No. 1 mirror mount in the direction of b.

Note:
If the distance between the No. 1 and 2 mirrors is too short, the copy image will be enlarged and if too long, reduced.



5. Lubrication

Clean the scanner rail; thereafter, apply lubricant evenly along the rail.

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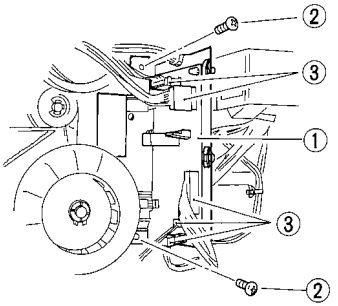
C. Main Motor Unit

1. Removing the Main Motor

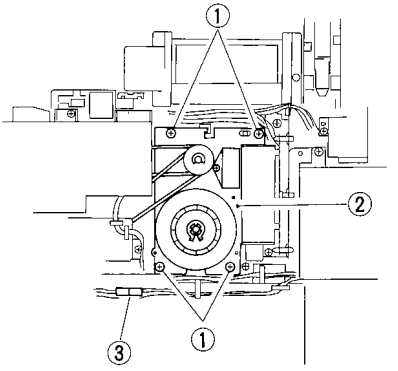
1) Remove the fixing assembly; see p. 4-28.
2) Remove the motor driver PCB; two mounting screws, five connectors.



① Motor driver PCB ③ Connectors
② Mounting screws

Figure 4-28

3) Remove the connector (J62).
4) Remove the four mounting screws; move the main motor to the left as far as it goes, detach the belt, lift, pull toward the front, and remove the main motor.



① Mounting screws ③ Connector (J62)
② Main motor unit

Figure 4-29

2. Mounting the Main Motor

The drive of the main motor is used to drive the drum and execute pick-up operations by way of timing belts.

To adjust the tension of the timing belt used to drive the drum, push the center of the belt using a spring gauge with a force of 500 g, and select the main motor mounting hole which enables the top and bottom of the belt to be 20 to 25 mm; see Figure 4-30.

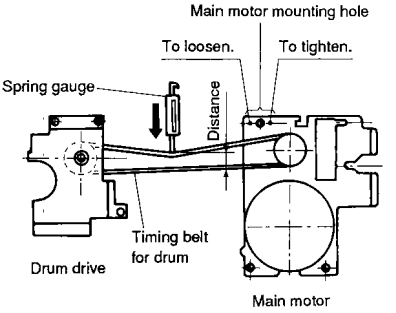


Figure 4-30

To adjust the timing belt used to execute pick-up operations, on the other hand, push the idle support plate with a force of 400 ±100 g, and fix it in place when it stops; see Figure 4-31.

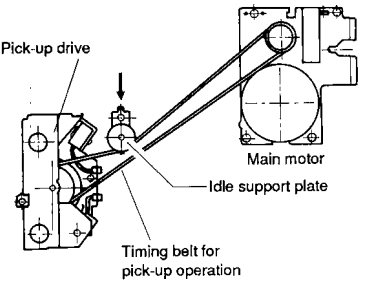


Figure 4-31

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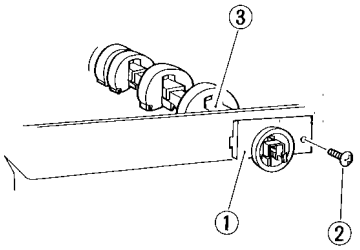
III. FEED SYSTEM

A. Pick-Up Unit

1. Pick-Up Roller Shafts (upper, lower)

1) Remove the lower front cover.

2) Remove the shaft flange, and remove the pick-up roller shaft.



① Shaft flange
② Mounting screw
③ Pick-up roller shaft

Figure 4-32

3) Detach the pick-up roller from the pick-up roller shaft.

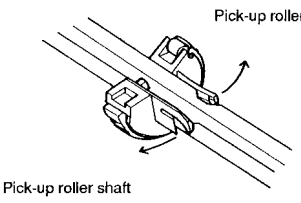


Figure 4-33a (viewed from above)

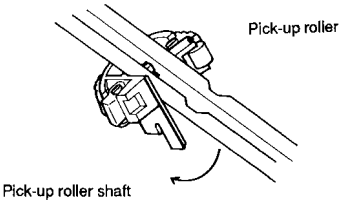
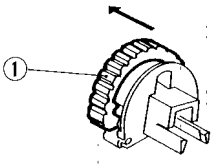


Figure 4-33b (viewed from above)

2. Pick-Up Roller

1) Detach the pick-up roller from the pick-up roller shaft.

2) Detach the rubber from the pick-up roller; see Figure 4-34.

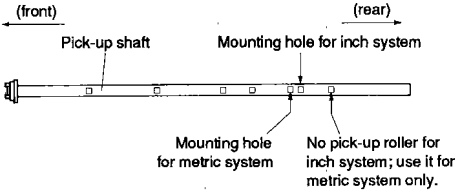


① Rubber on pick-up roller

Figure 4-34

3. Positioning the Pick-up Roller

See Figure 4-35 when mounting the pick-up roller on the ijpick-up shift; be sure to use the correct mounting hole.


(front)
(rear)
Pick-up shaft
Mounting hole for inch system
Mounting hole for metric system
No pick-up roller for inch system; use it for metric system only.

No notes are given above for mounting holes to be used in common in metric and inch systems alike.

Figure 4-35

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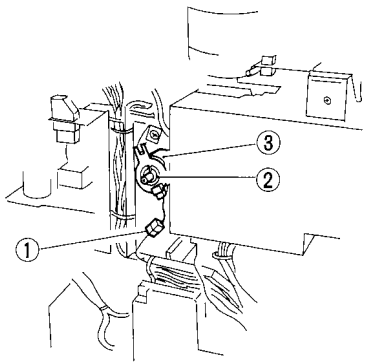
4. Registration Roller

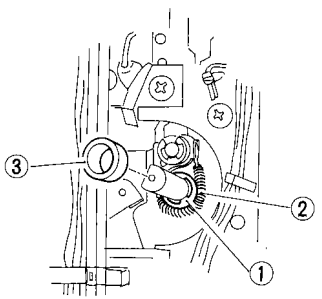
1) Remove the rear cover.
2) Disconnect the connector, remove the grip stop ring, and remove the registration clutch.



① Connector
② Grip stop ring
③ Registration clutch

Figure 4-36

3) Remove the spacer E-ring, and tension spring.

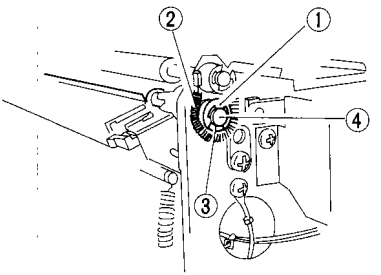


① E-ring
② Tension spring
③ spacer

Figure 4-37

5) Open the front door, and remove the inside covers (left, right).

6) Remove the E-ring, tension spring, and bushing, and remove the registration roller.



① E-ring
② Tension spring
③ Bushing
④ Registration roller

Figure 4-38

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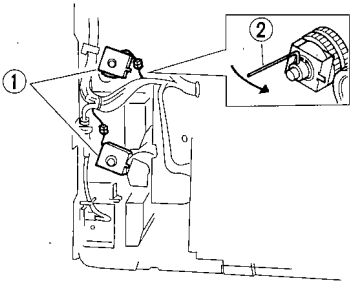
5. Feeder Rollers (1, 2)

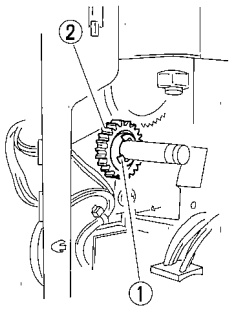
1) Remove the feeder roller clutch using a hex key.



① Feeder roller clutch
② Hex key

Figure 4-39

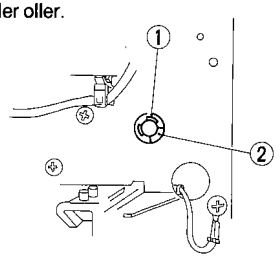
2) Remove the E-ring and gear; be careful with the parallel pin.



① E-ring
② Gear

Figure 4-40

3) Open the front door, and remove the inside covers (left, right).
4) Remove the E-ring and bushing, and remove the feeder oller.

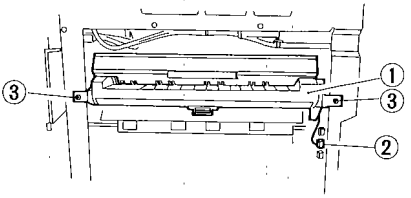


① E-ring
② Bushing

Figure 4-41

6. Manual Feed Pick-Up Roller (NP2020)

1) Remove the right cover.
2) Remove the manual feed pick-up unit; two mounting screws, one connector.



① Manual feed pick-up unit ③ Connector
② Mounting screw

Figure 4-42

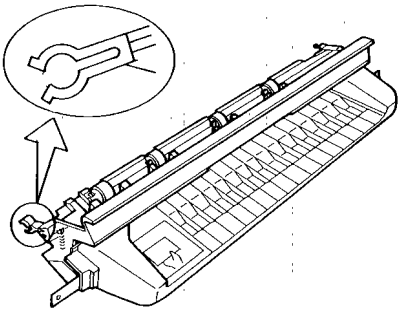
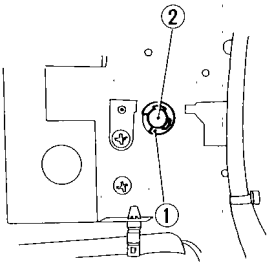


Figure 4-43 Manual Feed Pick-Up Unit

3) Remove the E-ring and bushing, and remove the manual feed pick-up roller.



① E-ring
② Manuaal feed pick-up roller

Figure 4-44

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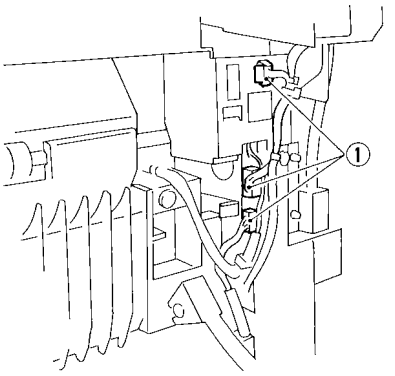
7. Detaching the Multifeeder (NP2120)

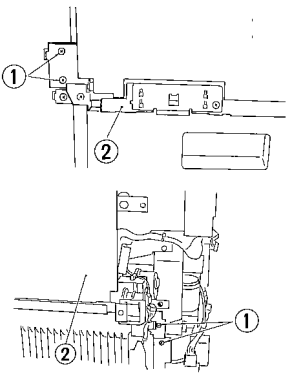
1) Detach the copier's right cover.
2) Remove the three jacks.



① Jacks

Figure 4-44a

3) Remove the four screws, and detach the multifeeder assembly.

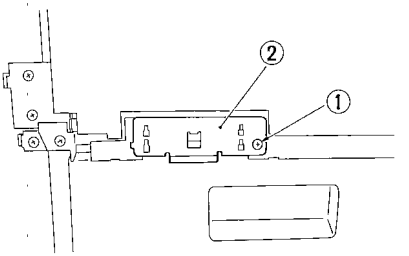


① Screws
② Multifeeder assembly

Figure 4-44b

8. Detaching the Multifeeder Separation Pad (NP2120)

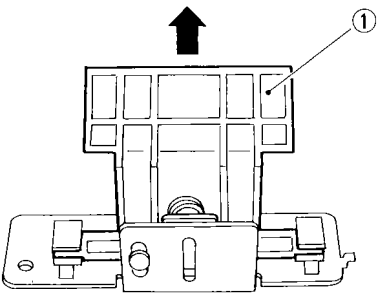
1) Detach the right cover.
2) Remove the screw, and detach the separation pad together with its mount.



① Screw
② Mount

Figure 4-44c

3) Take out the separation pad into the direction of the arrow.



① Separation pad

Figure 4-44d

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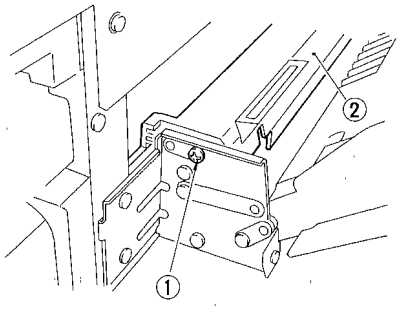
9. Detaching the Multifeeder Pick-Up Roller (NP2120)

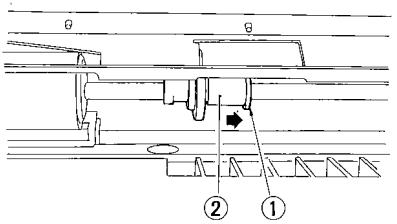
1) Detach the right cover.
2) Remove the screw, and detach the bushing; then, detach the roller cover.



① Bushing
② Roller cover

Figure 4-44e

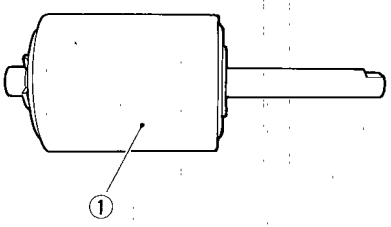
3) Remove the E-ring (plastic), and move the busing in the direction of the arrow.



① E-ring
② Bushing

Figure 4-44f

4) Detach the pick-up roller together with its shaft.



① Pick-up roller

Figure 4-44g

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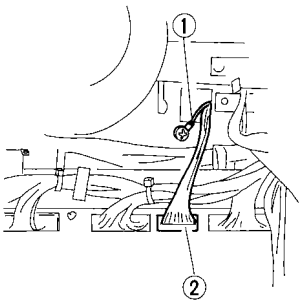
B. Feeder Unit

1. Feeder Unit

Note:
Make sure that the drum unit, transfer corona unit, and developing assembly are removed before removing the feeder unit.

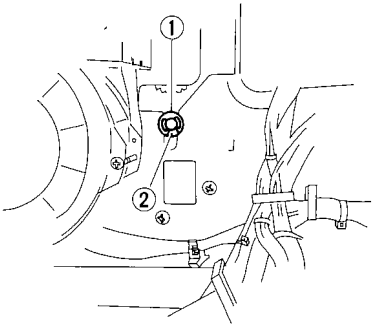
1) Relpace the feeder unit.
2) Remove the main motor unit.
3) Disconnect the connector (J309) from the DC controller PCB, and remove the grounding wire.



① Grounding wire
② Connector (J309)

Figure 4-45

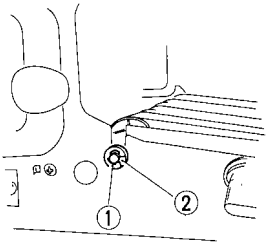
3) Remove the E-ring and the bushing.



① E-ring
② Bushing

Figure 4-46

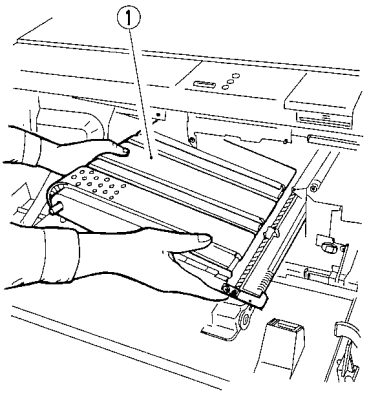
4) Remove the inside left cover, and remove the E-ring and bushing.



① E-ring
② Bushing

Figure 4-47

5) Lift the fixing assembly side of the feeder unit, and pull it toward the front to remove.



① Feeder unit

Figure 4-48

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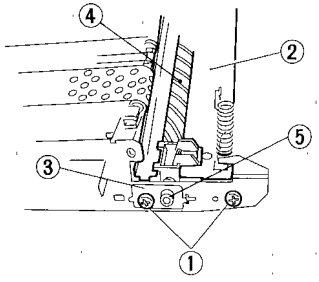
2. Feeder Belt

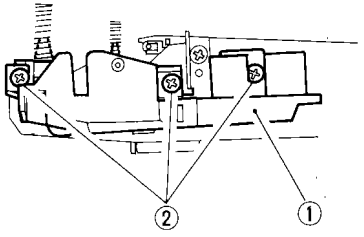
1) Remove the feeder unit.
2) Remove the two screws from the front, and remove the screw mount, brushing, lead screw, and gear..



① Mounting screw
② Transfer corona unit rail
③ Screw mount
④ Lead screw
⑤ Bushing

Figure 4-49

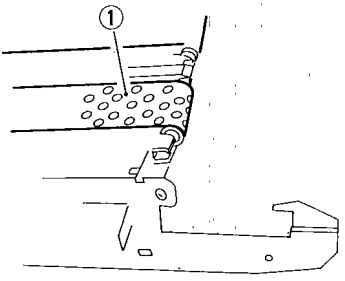
3) Remove the three screws, and remove the electrode holder at the rear.



① Electrode holder
② Mounting screws

Figure 4-50

4) Disengage the hook, and remove the motor cover.
5) Remove the four fastons from the microswitch.
6) Remove the screws at the rear, and remove the corona unit rail.
7) Detach the feeder belt.

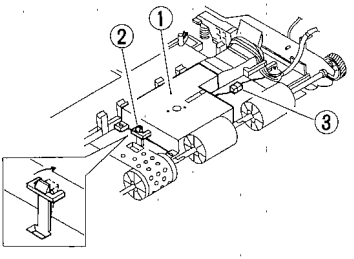


① Feeder belt

Figure 4-51

3. Feeder Fan

1) Remove the two feeder belts.
2) Disconnect the connector, disengage the hook, and remove the feeder fan.



① Feeder fan
② Hook
③ Connector

Figure 4-52

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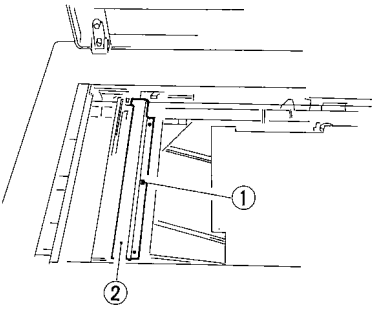
IV. EXPOSURE SYSTEM

A. Illuminating Unit

1. Removing the Scanning Lamp

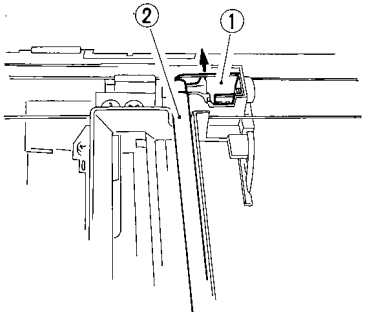
1) Disconnect the power plug.
2) Remove the copyboard glass.
3) Remove the mounting screw, and remove the light shutter.



① Mounting screws
② Light shutter

Figure 4-53

4) Push the lamp electrode plate (rear) in the direction of the arrow, and remove the scanning lamp.



① Lamp electrode plate (rear)
② Scanning lamp

Figure 4-54

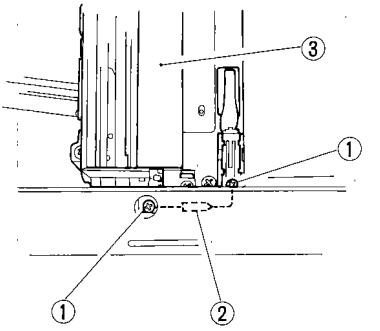
Note:
i. Wait until the scanning lamp has cooled before starting the work.
ii. Do not leave finger prints on the scanning lamp.
iii. Dry wipe the scanning lamp if it is soiled.

2. Removing the Thermal Fuse

1) Remove the control panel, and remove the copyboard glass.

2) Hold the rear side of the No. 1 mirror unit, and move it to the right as shown in Figure 4-55.

Note :
Be sure to hold the rear side when moving the No. 1 mirror mount.



① Mounting screw
② Thermal fuse
③ No. 1 mirror mount

Figure 4-55

3) Remove the two mounting screws, and remove the thermal fuse.

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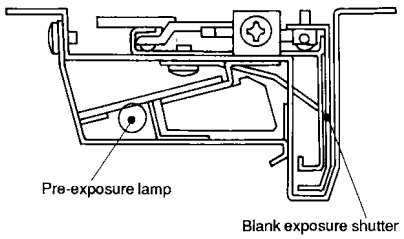
B. Blank Exposure Unit

1. Construction

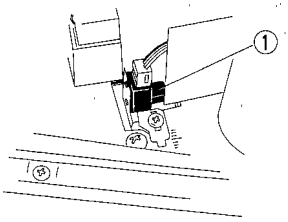


2. Pre-Exposure PCB

1) Remove the rear cover.
2) Disconnect the connector (J731) from the pre-exposure PCB.
3) Hold the pre-exposure PCB using a wrench, and pull it straight up; take care not to damage the PCB and elements on it.

3. Blank Exposure Unit

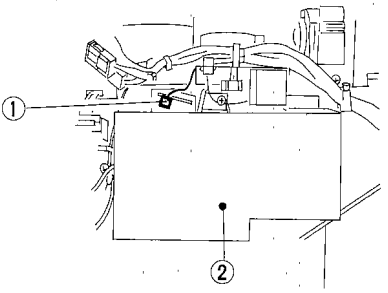
1) Remove the copyboard glass, lens cover, rear cover, drum unit, and developing assembly.
2) Mark the blank exposure shutter home position sensor on the lens mount using a scriber, and remove it.



① Sensor

Figure 4-57

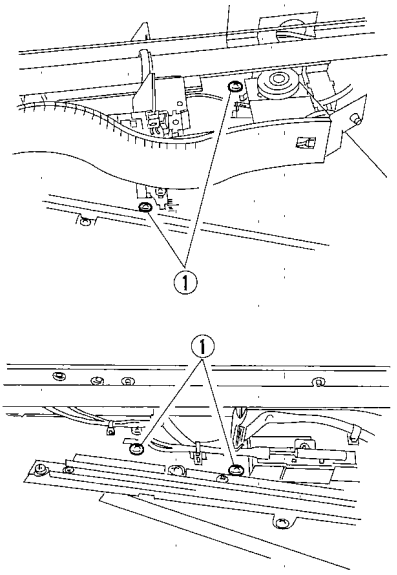
3) Disconnect the connector (J731) from the pre-exposure PCB.



① Connector ② HVT

Figure 4-58

4) Hold the blank exposure unit from below, remove the three mounting screws, and pull it to the front to remove.



① Mounting screws

Figure 4-59

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4. Using the Mirror Cleaning Tool

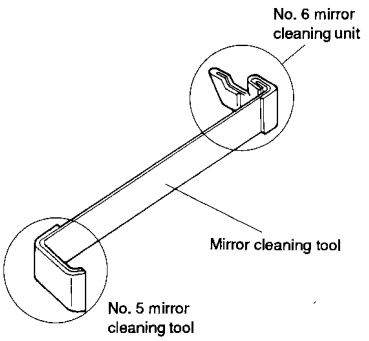

Figure 4-60

5. Cleaning the No. 5 Mirror

1) Remove the copyboard glass and lens cover, and remove the mirror cleaning tool from the lens mount; one screw.
2) Remove the lens cover, and insert the mirror cleaning tool as shown in Figure 4-61.

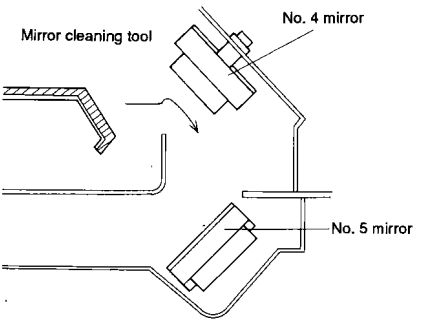

Figure 4-61

3) Put the mirror cleaning tool against the No. 5 mirror as shown in Figure 4-62, and clean the mirror by sliding the tool.

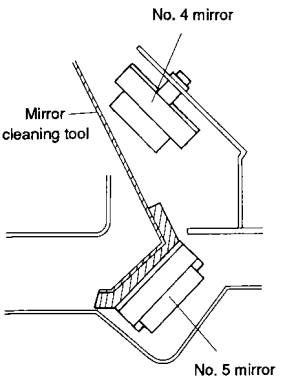

Figure 4-62

6. Cleaning the No. 6 Mirror

1) Remove the drum unit, developing assembly, and dust-proof glass.
2) Put the mirror cleaning tool against the No. 6 mirror as shown in Figure 4-63, and clean the mirror by sliding the tool.

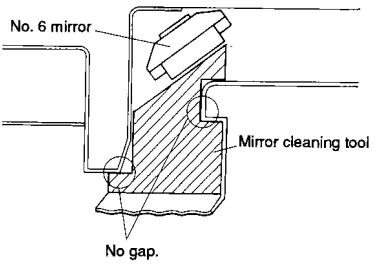

Figure 4-63

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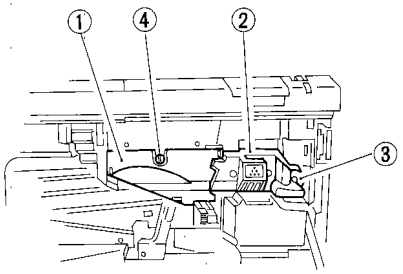
V. CORONA SYSTEM

A. Drum Unit

1. Removing the Drum Unit

1) Open the front door, and remove the knob.



① Drum unit ④ Knob
② Developing assembly
③ Developing assembly release lever

Figure 4-64

2) Turn the developing assembly release lever counterclockwise.
3) Pull the drum unit to the front to remove.

Note:
Take care not to damage the drum.

The photosensitive drum is susceptable to light; if exposed to room light, the drum can cause white spots or black lines on the copies.

As a rule, the copier should never be turned ON with the drum unit removed; otherwise, the registration roller and transfer guide may interfere, and the registration roller can be damaged by the transfer guide during warm-up rotation.

Note:
Do not press the COPY START key.

2. Cleaning

If the photosensitive drum is soiled, clean it using a flannel cloth coated with toner; do not use paper, ling-free or otherwise.

Note:
Do not use solvents to clean the drum; or, do not use cleaning powder.

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B. Primary and Transfer Corona Units

1. Outline

The photosensitive drum is surrounding by the primary and transfer corona units.

The primary corona unit is equipped with a grid plate.

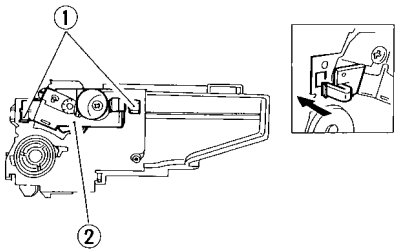
2. Disassembly and Assembly

a. Primary Corona Unit

1) Remove the drum unit.

Note:
If exposed to strong light for a long time, the photosensitive drum can cause white spots or black lines on the copy images; take extra care to protect it from light.

2) Disengage the two hooks, and pull out the primary corona unit from the drum unit.

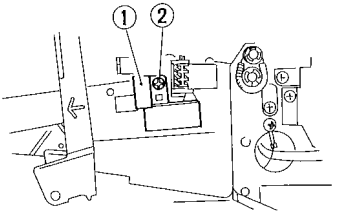


① Hooks ② Primary corona unit

Figure 4-65

b. Transfer Corona Unit

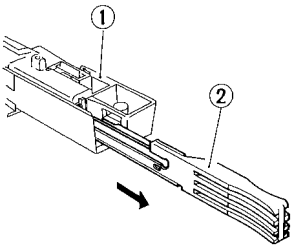
1) Remove the transfer corona unit cover,and remove the transfer corona unit.



① Transfer corona unit cover
② Mounting screw

Figure 4-66

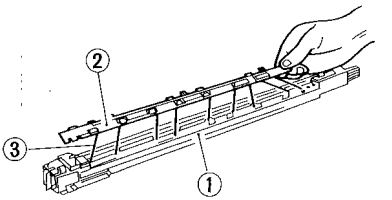
2) Pull out the static eliminator.



① Transfer corona unit
② Static eliminator

Figure 4-67

3) Disengage the three hooks, and remove the guide wire retainer.



① Transfer corona unit ③ Guide wire
② Guide wire retainer

Figure 4-68

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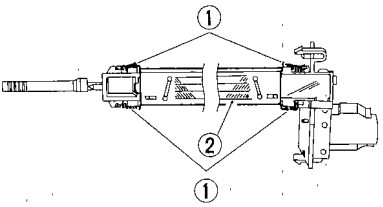
c. Attaching the Corona Wires for the Primary and Transfer Corona Units

■ Primary Corona Unit

1) Remove the four tension springs and grid plate.



① Grid plate tension spring ② Grid plate

Figure 4-69

■ Transfer Corona Unit

2) Remove the guide wire retainer; see p. 4-22.
3) Loosen a length of about 40 mm of corona wire from a 0.06-dia. wire reel, and form a loop at the end with a diameter of about 2 mm.

Note:
To form a loop, wind the corona wire around a hex key once, and turn the key four to five times; thereafter, twist the wire.

4) Cut off the end (excess) of the corona wire to less than 1 mm using a nipper.
5) Hook the loop of the corona wire as shown in Figure 4-70, and fit the wire along the V-groove of the height adjusting block.
Hook the corona wire tension spring on the corona wire, and turn the spring three to four times as shown in Figure 4-70.

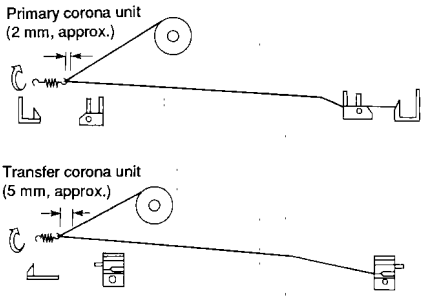


Figure 4-70

6) Cut off the end (excess) of the corona wire to less than 1 mm using a nipper.
7) Pick the end of the corona wire tension spring using tweezers, and hook it on the corona electrode.

Note:
- Check that the corona wire is free of twist and its gold-plating is intact.
- Check that the corona wire is taut; correct, if the length of the tension spring is about 12 mm.
- Check that the corona wire is fitted along the V-groove of the height adjusting block.

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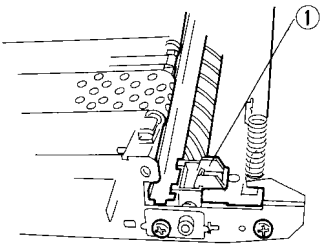
3. Mounting the Transfer Corona Unit

1) Check that the wire cleaning mount is at the home position.



① Wire cleaning mount

Figure 4-71

2) Move the wire cleaner of the transfer corona unit by hand to the front.
3) Slide the transfer corona unit into the copier, and check that the pins of the wire cleaner are inside the wire cleaner unit.
4) Mount the transfer corona unit cover.

■ If the wire cleaner mount is not at the home position, perform the following:

- The wire cleaner mount stops where it is as soon as the copier is turned OFF during cleaning operation; in such cases, work as follows:

1) Move the wire cleaner of the transfer corona unit by hand to the rear as far as it goes.
2) Mount the transfer corona unit.
3) Turn the power ON with the feeder unit released, and check that the wire cleane returns to the home position.

Note:
The step given above is for when the cleaning motor is in good condition; if the motor is not in good condition or if the wire cleaner mount fails to return to the home position because of displaced screws, the COPY START key on the control panel remains red. As such, if the key remains red after the wait period, check the cleaning motor.

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VI. DEVELOPMENT SYSTEM

A. Developing Assembly

1. Construction

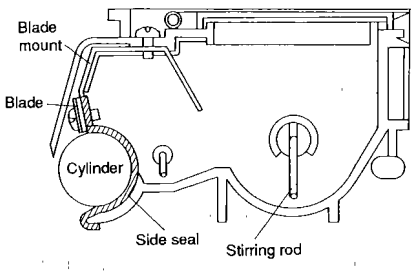
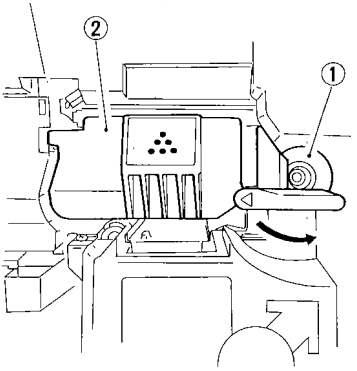


Figure 4-72

2. Removing the Developing Assembly

1) Turn the developing assembly release lever counterclockwise.
2) Slide the developing assembly with care.
3) Hold the grip of the developing assembly, and remove it from the copier.

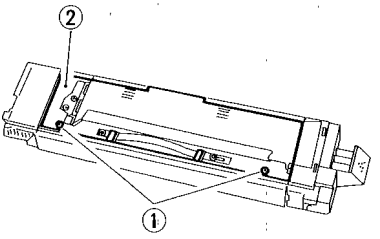


① Developing assembly release lever
② Developing assembly

Figure 4-73

3. Removing the Blade, Developing Cylinder, and Side Seal

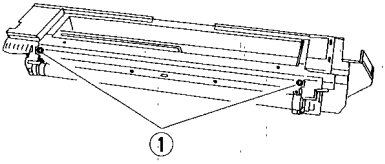
1) Remove the developing assembly from the copier.
2) Remove the two screws, and remove the developing assembly upper cover.



① Screws
② Developing assembly upper cover

Figure 4-74

3) Place a newspaper on the floor, and empty the developing assembly of toner.
4) Remove the two screws, and remove the blade mount together with the mount.



① Mounting screws

Figure 4-75

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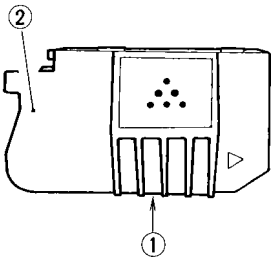
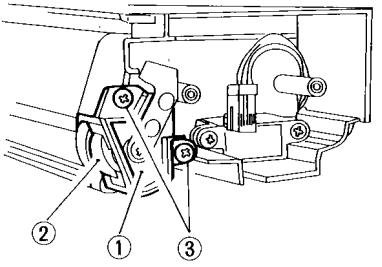
5) Remove the hook, and remove the grip.



① Hook ② Grip

Figure 4-76

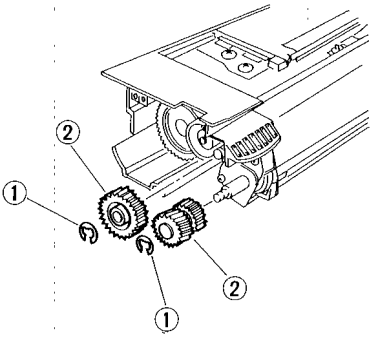
6) Remove the three screws, and remove the developing cylinder holder (front), washer, and developing roll.



① Developing cylinder holder
② Developing roll
③ Screws

Figure 4-77

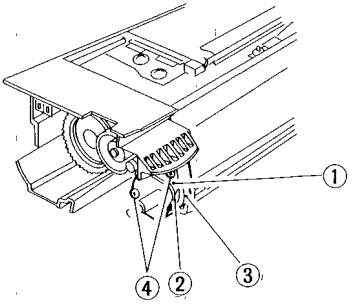
9) Remove the two E-rings and two gears.



① E-rings ② Gears

Figure 4-78

10) Remove the two screws, and remove the developing cylinder holder (rear), ball bearing, and developing roll.



① Developing cylinder holder
② Ball bearing
③ Developing roll
④ Screws

Figure 4-79

11) Remove the developing cylinder and side seal.

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4. Mounting the Side Seal and Blade

1) Clean the surface using an alcohol solution to prepare for the attachment of the side seal.
2) Attach the side seals at the locations shown in Figures 4-80 and -81; short, then long seal.

Attach the seal so that the long round hole of the end seal and the round hole of the developing assembly are matched.

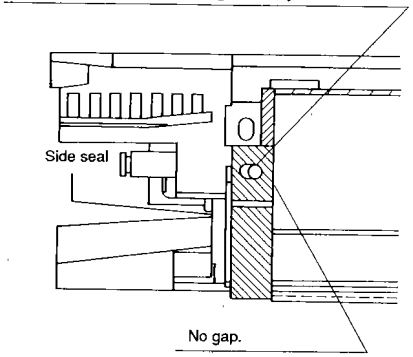

Figure 4-80 (front view)

Note:
Attach the seal so that the long round hole of the end seal and the round hole of the developing assembly are matched.

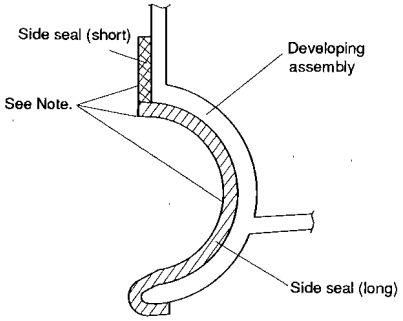

Figure 4-81 (cross section)

Note:
i. Put the side seal (short) and side seal (long) together as shown, and attach them around the developing assembly.
ii. Make sure that the short and long seals are positioned as shown in Figure 4-81.

3) Mount all parts except the blade.

For the gear, engage long tooth a and groove b to put the pieces together.

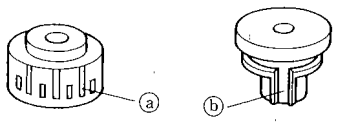

Figure 4-82

4) Push the blade mount against the developing cylinder in the direction of the developing assembly, and tighten the two screws.

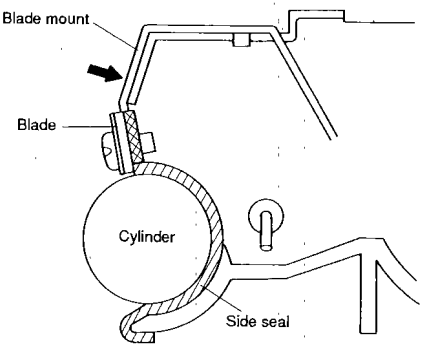

Figure 4-83

5) Loosen the four screws that hold the blade on the blade mount, and re-tighten them.

Note:
Do not loosen the screws too much; otherwise, the blade may come off the positioning pin at the center.

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VII. FIXING SYSTEM

A. Fixing Assembly

1. Construction

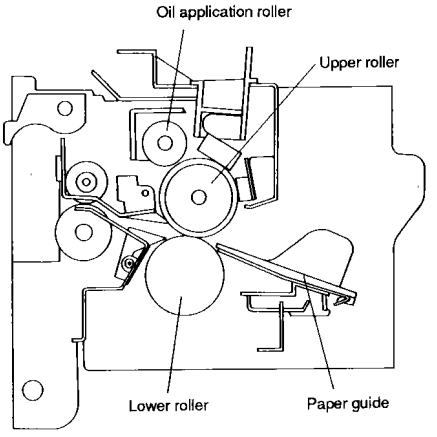
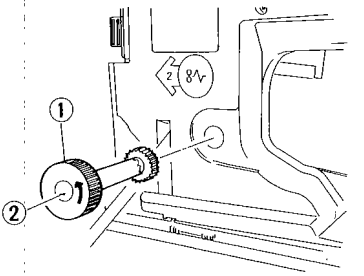


Figure 4-84

2. Removing the Fixing Assembly

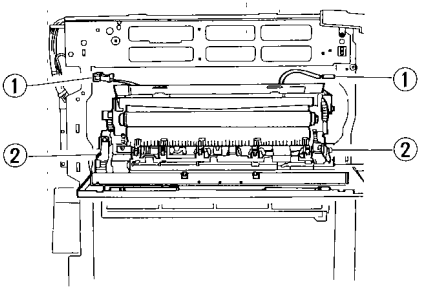
1) Open the front cover, and remove the fixing assembly knob.



① Fixing assembly knob
② Mounting screw

Figure 4-85

2) Remove the left cover.
3) Disconnect the three connectors.
4) Remove the two mounting screws, and slide out the fixing assembly.



① Connectors
② Mounting screws

Figure 4-86

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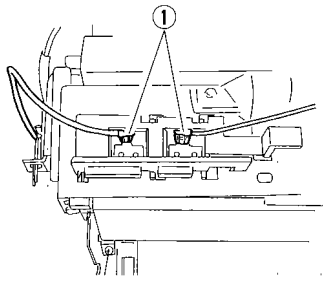
3. Fixing Heater

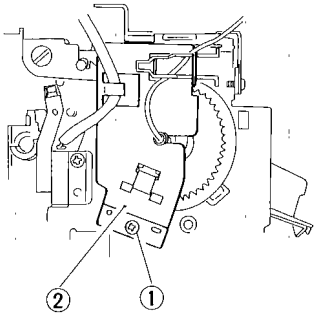
1) Remove the fixing assembly.
2) Remove the two fastons.



① Fastons

Figure 4-87

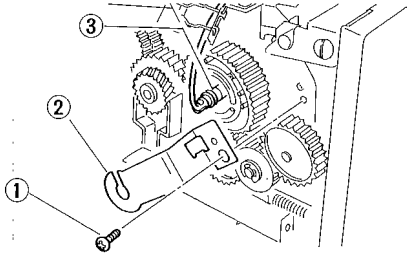
3) Remove the mounting screw, and remove the heater mounting plate (front).



① Mounting screw
② Heater mount plate (front)

Figure 4-88

4) Remove the mounting screw, and remove the heater mount plate (rear); thereafter, slide out the fixing heater.

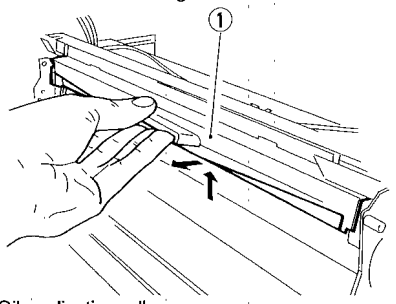


① Mounting screw ③ Fixing heater
② Heater mount plate (rear)

Figure 4-89

4. Upper Fixing Roller

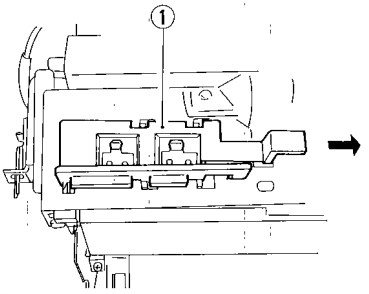
1) Hold the grip of the oil application roller, and pull to the front while lifting to remove the roller.



① Oil application roller

Figure 4-90

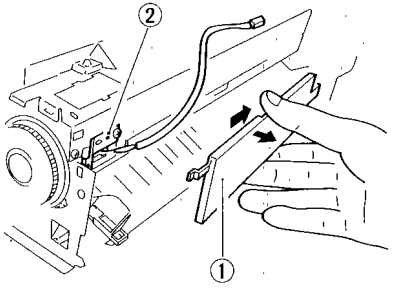
2) Remove the fixing heater.
3) Remove the thermoswitch holder.



① Thermoswitch holder

Figure 4-91

4) Lift the clep, and remove the thermistor cover; then, remove the thermistor.



① Clip
② Thermistor cover
③ Thermistor

Figure 4-92

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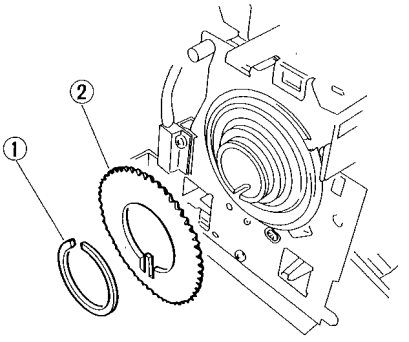
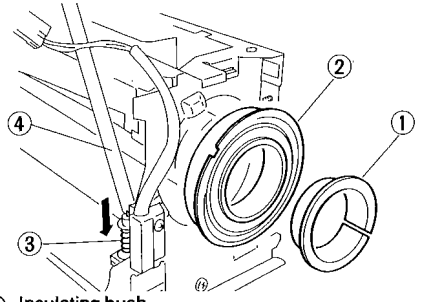
5) Remove the C-ring, and remove the gear.



① C-ring ② Gear

Figure 4-93

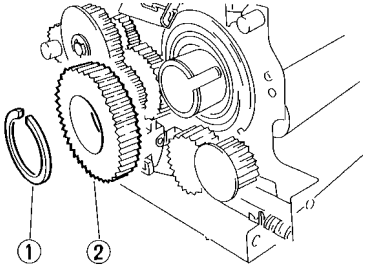
6) Push the pressure spring of the lower fixing roller down (disengage), and remove the insulating bush and bushing.



① Insulating bush
② Bushing
③ Pressure spring for lower fixing roller
④ Screwdriver

Figure 4-94

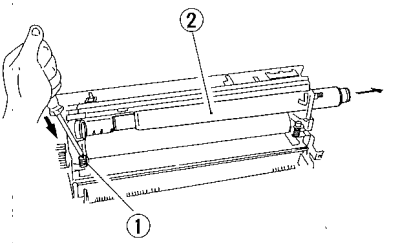
7) Remove the C-ring at the rear of the fixing assembly, and remove the gear.



① C-ring ② Gear

Figure 4-95

8) Push the lower roller pressure spring at the rear of the fixing assembly, and pull out the upper fixing roller into the direction of the arrow (front of fixing assembly).



① Pressure spring for lower roller
② Upper fixing roller

Figure 4-96

5. Lower Fixing Roller

1) Remove the upper fixing roller.
2) Lift the lower fixing roller together with the bushing to remove.

6. Mounting the Heater and Upper Fixing Roller

Reverse the steps for mounting the heater and upper fixing roller with the following in mind.

a. Heater
① Do not touch the heater.
② Orient the heater so that the end with the manufacturer's name is to the front.

b. Upper Fixing Roller
① Keep the roller wrapped in copy paper to protect against dirt and scratches.
② Orient the upper fixing roller so that the end with two C-rings are to the rear.

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7. Adjusting the Nip (tightening the pressure nut)

The nip width should be as shown in Table 4-1; otherwise, turn the bolt.

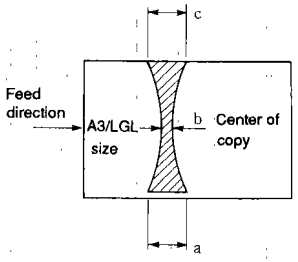

Figure 4-97

Note:
a and c represent a point 15 mm from the sides of the copy.

Dimension	Nip*
b	0 ±0.5 mm
|a–c|	0.5 mm or less

Table 4-1

* With both upper and lower rollers adequately heated.

a. Measuring the Nip

If the roller is cool, wait for 15 minutes after the WAIT indicator goes green; make 20 copies, and take measurements.

1) Open the copyboard cover, and make a solid black copy in A3.
2) Switch the power OFF as soon as the leading edge of the copy comes out to the copy tray; open the front doo and delivery unit.
3) Turn the fixing assembly knob slightly counterclockwise; keep it for 15 seconds, and turn the knob further to remove the copy paper from the fixing assembly.
4) Measure the width over which the toner is shiny; see Figure 4-97.

8. Mounting the Thermistor

Check that the detection face of the thermistor is evenly in contact with the surface of the upper fixing roller.

Note:
The thermistor position need not be adjusted; if the contact is not even, check if the thermistor spring is deformed.

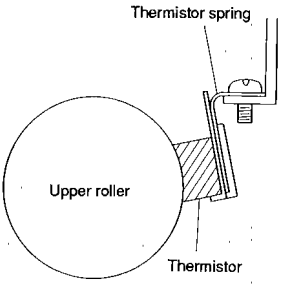

Figure 4-98

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9. Mounting the Thermal Switch

Check that the detection face of the thermal switch is evenly in contact with the surface of the upper fixing roller.

Make sure that the hook of the thermal switch holder is securely engaged with the fixing assembly upper plate.

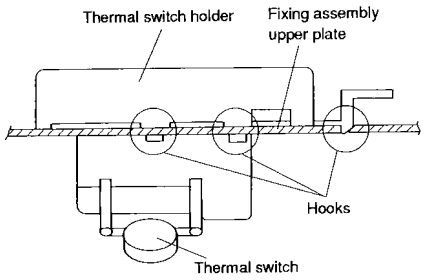

Figure 4-99

Note:
The thermal switch need not be adjusted; if the contact is not even, check if the thermal switch spring is deformed.
Do not use mounting screws other than those specified.

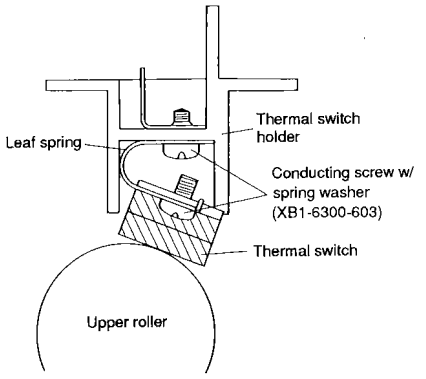

Figure 4-100

10. Position of the Paper Guide

The paper guide is positioned by the paper guide mount. As such, the position of the paper guide need not be adjusted.

Note:
The position of the paper guide needs to be adjusted if the paper guide mount has been removed; therefore, do not loosen the screw on the paper guide. If necessary, mark the position on the fixing assembly mount using a scriber before loosening the screw.

Note:
To adjust the position of the paper guide, place the fixing assembly on a desk, and move the paper guide mount so that it is positioned as shown in Figure 4-101.

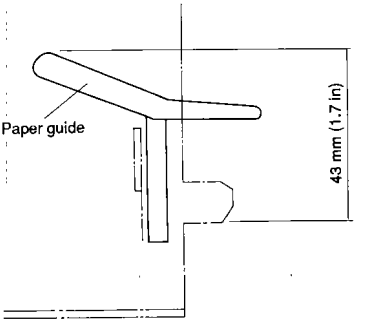

Figure 4-101

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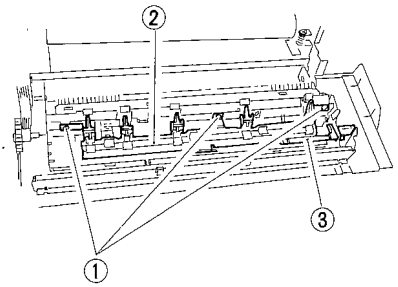
11. Removing the Upper Separation Claw

1) Open the delivery unit.
2) Mark the position of the upper separation claw retainer using a scriber.
3) Remove the three mounting screws, and remove the upper separation claw retainer; be careful with the delivery detection lever at the time.



① Mounting screws
② Upper separation claw retainer
③ Delivery detection lever

Figure 4-102

4) Remove the spring, and remove the upper separation claw.

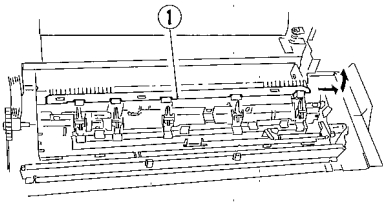
12. Mounting the Upper Separation Claw

Reverse the steps above to mount the upper separation claw with the following in mind:

- Keep the upper separation claw unit to the rear; if a scar is made on the upper fixing roller, mount the claw about 4 mm displaced to the front.

13. Removing the Lower Separation Claw

1) Open the delivery unit.
2) Slide the lower separation guide plate to remove.



① Lower separation guide plate

Figure 4-103

3) Remove the spring, and remove the lower separation claw.

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I. LOCATION

The location of the copier should be chosen based on the following considerations. If possible, make a visit to the user for a study of the site before delivery of the copier.

A. The ambient temperature should be between 7.5°C to 35°C (45.5°F to 85°F) and the humidity, 10% to 80%. Avoid locations near water faucets, humidifiers, water boilers, and refrigerators.
B. Avoid locations near open fire or subject to dust or ammonia fumes and direct rays of the sun. Provide curtains over the windows if necessary.
C. Choose a well-ventilated place.
D. Make sure all feet of the copier will be in contact with the floor.
E. Allow at least 10 cm (3.9 in) from any wall to provide access.

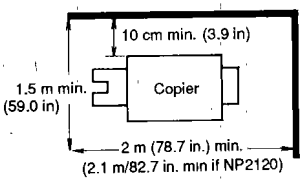

Figure 5-1

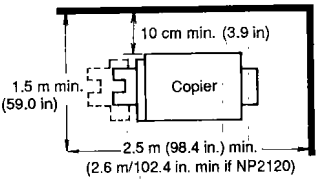

Figure 5-2 (with sorter)

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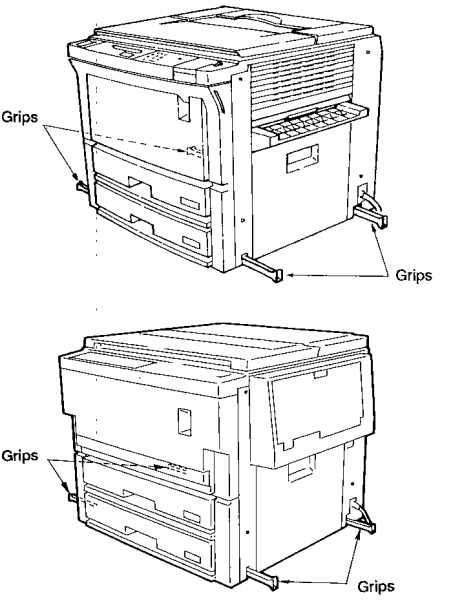
II. UNPACKING AND INSTALLING THE COPIER

When a piece of metal is moved from a cold place to a warm place, droplets of water form on its surface. This phenomenon is known as condensation and affects the performance of machines. The simplest way to eliminate condensation in the copier, any machines for that matter, is to leave it alone until it warms to room temperature (at least one hour).

A. Unpacking

Step	Work	Remarks
1	Open the shipping carton.	
2	Remove the plastic cover, and pull out the five grips from the copier. With three persons, hold the grips and place the copier on the pedestal. If a pedestal is used, make sure it has been installed correctly according to its installation manual. If you are placing the machine on a cassette pedestal, make sure that the pedestal has been installed properly according to the INSTALLATION PROCEDURE that comes with it.	
3	Open the cardboard box, and take out the parts and accessories.	Check that the following are available: • Copy tray • OPERATOR'S MANUAL • Drum unit • Black toner
4	Remove all tape, and take out the cassettes; remove the cushion blocks from inside the cassettes.	

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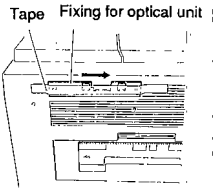
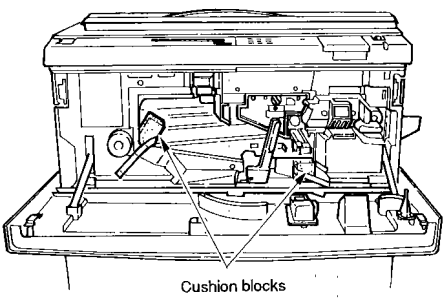
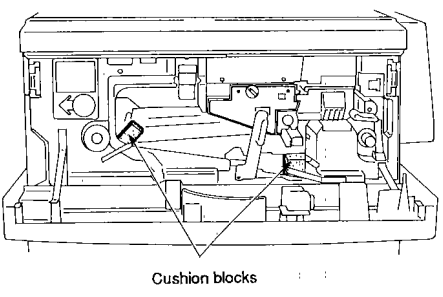
Step	Work	Remarks
5	Remove the tape that secures the optical unit in place (outside the left cover), and slide the fixing to the right and pull it out.	
6	Open the front cover, and disengage the developing assembly, and remove it from the copier.	Check that the developing cylinder is free of scratches.
7	Remove the cushion blocks from the feeder unit and fixing assembly.	 

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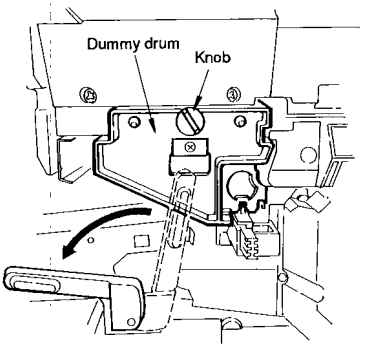
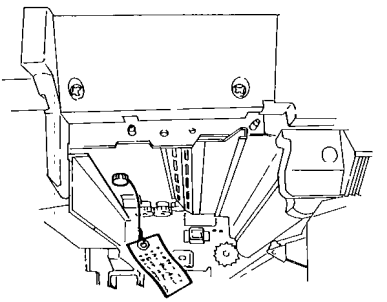
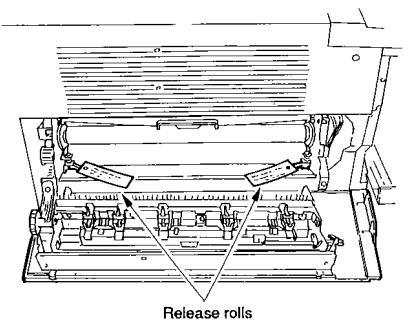
Step	Work	Remarks
8	Disengage the feeder unit, remove the knob, and remove the dummy drum. Keep the knob for use later.	
9	Remove the lens lock screw (w/ shipping tag) from between the drum unit rails of the copier.	
10	Open the delivery cover, and remove the two fixing roller release rolls. The reafter, close the delivery cover.	

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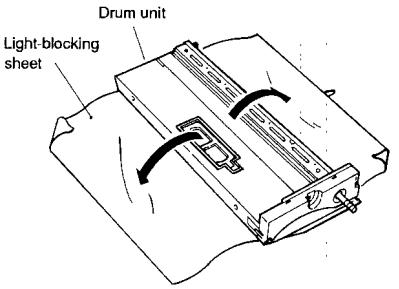
B. Mounting the Drum

The photosensitive drum is susceptable to light; if exposed to room light, it can cause white spots or black lines on the copy images. As such, be quick in performing the following work.

Step	Work	Remarks
1	Take out the drum cartridge from the box, and remove the light-blocking sheet.	 Take care not to damage the drum.
2	Set the drum unit in the copier, and fix it in place using the knob that held the dummy drum.	Slide the drum unit straight along the rails into the copier.
3	Move the grip to clean the corona wire of the drum unit two to three times.	
4	Set the developing assembly in the copier, and engage it.	The front cover may be left open.

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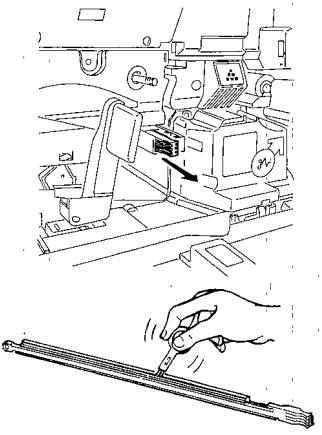
C. Checking the Operation

Step	Work	Remarks
1	Turn the door switch ON using the door switch actuator.	
2	Connect the power plug, and shift the POWER switch to '|'.	Check that the ADD PAPER and CASSETTE OUT indicators go ON and the WAIT indicator lights red.
3	Set the cassette size to suit the needs of the user.	See p. 5-8.
4	Put copy paper in the cassette, and set the cassette in the copier.	• Check that the ADD PAPER indicator go OFF. • Press the keys, except the COPY START key, on the control panel, and check that each operation is correct.
5	Set the copy tray on the copier.	
6	Open the copyboard cover, and remove the paper and the protection seal from the document size plate.	
7	Record the reading of the copy counter.	
8	Make a copy after the COPY START key has gone green. Wait for ten seconds or more after the drum has stopped, and make another copy (if NP2120, 9 copies).	Check the following: • No abnormal sound is heard; and • The ADD TONER indicator flashes about five to ten seconds after the second copy operation is over.
9	Check that the counter operates properly.	Check that the reading has increased by 2 (if NP2120, 10) from the reading recorded in step 8.
10	Slide out the static eliminator, and clean it using the cleaning brush (accessory); the feeder unit may be left engaged.	
11	Slide the static eliminator back in.	

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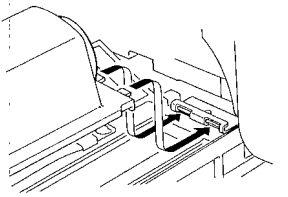
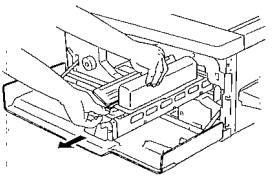
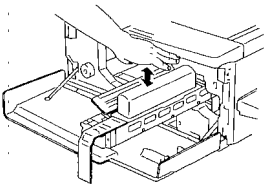
D. Adding Toner

Step	Work	Remarks
1	Remove the door switch actuator.	
2	Disengage the developing assembly, and slide it until it stops.	
3	Shake the toner cartridge well.	
4	Open the developing assembly lid, and fit the boss on the rear end of the toner cartridge into the hole of the plate on the rear end of the developing assembly; thereafter, pull the toner cartridge to the front somewhat so that it comes into contact with the boss found on the left side of the front.	
5	Hold the toner cartridge, and pull on the seal to the front until it stops.	
6	Tap lightly on the top of the toner cartridge until all toner has fallen into the developing assembly.	
7	Remove the toner cartridge, and keep it in an empty box.	
8	Close the developing assembly lid, and slide the assembly inside until it stops.	
9	Turn the developing assembly lever clockwise to engage it.	
10	Close the front cover.	
11	Set a blank sheet of paper (A3/11"X17") on the copyboard after the COPY STARAT key goes green, and make six to ten copies.	The operation causes the toner inside the developing assembly to be stirred.

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E. Checking the Image

Step	Work	Remarks
1	Place the Test Sheet on the copyboard, and check the image.	Check that copies are made without a problem and the non-image width along the leading edge is correct; otherwise, make adjustments. Non-image width: 2.0 mm/0.08 in (approx.) for leading edge 2.5 mm/0.1 in (approx.) on left/right side
2	Feed paper in the manual mode.	Make tow-sided and overlay copies, and check that the operation is correct; otherwise, make adjustments. Check pick-up by the multifeeder (NP2120).
3	Put the OPERATOR'S MANUAL in the pocket of the copyboard cover.	
4	Clean up the area around the copier, and fill out the Service Sheet.	

When all above work is finished, install the options (ADF-A1, MS-A1, Sorter-A1, Stapler Sorter-B1, Stapler Sorter-B2, and/or Control Card) and the document holder.

■ Points to Note for Photosensitive Drum After Installation

The photosensitive drum is susceptible to light and, if exposed to light, can cause white spots or black lines on the copy image; take note of the following:

- Limit the replacement of the CT unit within one minute;
- Limit the removal of jams within five minutes; and
- Keep the drum wrapped in the light-blocking sheet (from drum unit) or fresh copy paper and place it in a dark place whenever it is removed from the copier.

Do not touch the drum; if its surface is soiled, wipe off the dirt using a flannel cloth coated with toner. Do not use paper, lint-free or otherwise, or use a dry cloth or solvent.

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III. SETTING THE CASSETTE SIZE

The copier's cassette may be modified to suit the desired paper size by modifying the rear stop plate, spring, and face plate.

① Modifying the Cassette Size

1) Turn over the cassette, and remove the screw that holds the rear stop plate in place.

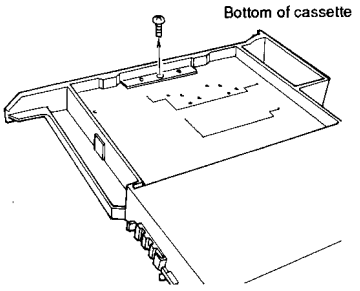

Figure 5-3

2) Change the rear stop plate to suit the desired paper size; note the index on the bottom, and see Table 5-1.

Note:
For the following, use two rear stop plates; note the index on the bottom of the cassette: B4, A4-R, LGL, ARG-R, 11X17, LTR-R.FLS, G.R, FOLIO, G.LGL, AUS. FLS, BLV., ARG.LGL, E., OFC

Copy paper	Size	Rear stop plate
A3	297mm5420mm (11.7"X16.5")	A3
11X17	297mmX432mm (11"X17")	11X17
A4	297mmX210mm (11.7"X8.3")	A4
Letter	279mmX216mm (11.0"X8.5")	LTR
Government Letter	267mmX203mm (11.7"58.3")	G.
Korean	265mmX190mm (10.4"X7.5")	K.
B4	257mmX364mm (10.1"X14.3")	B4
Legal	216mmX356mm (8.5"X14.0")	LGL
B5	257mmX182mm (10.1"X7.2")	B5
Argentine Letter	280mmX220mm (11.0"X8.7")	Arg.
A4-R	210mmX297mm (8.3"X11.7")	A4 R
Letter-R	216mmX279mm (8 .5"X11.0")	LTR R
B5R	182mmX257mm (7.2"X10.1")	B5 R
Argentine Legal	220mmX340mm (8.7"X13.4")	Arg.LGL
Government Letter-R	203mmX267mm (8.0"X10.5")	G. R
Government Legal	203mmX330mm (13.0"X8.0")	G. LGL
Argentine Letter-R	220mmX280mm (8.7"X11.0")	Arg. R
Foolscap	216mmX330mm (8.5"X13")	FLS
Folio	210mmX330mm (8.3"X13")	FOLIO
Australian Foolscap	206mmX337mm (8.1"X13.3")	Aus.FLS
Korean-R	190mmX265mm (7.5"X10.4")	K. R
Officio	216mmX317mm (8.5"X12.5")	OFC
Ecuadorean Officio	220mmX320mm (8.0"X10.5")	E.
Bolivian Officio	216mmX355mm (8.5"X14.0")	BLV

Table 5-1

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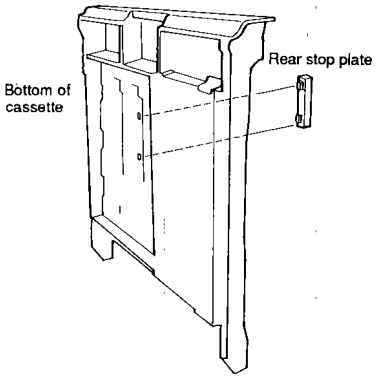

Figure 5-4

3) Fix the stop plate in place using screws (M4×10).

Note:
See "Replacing the Cassette Spring" when using a different type of spring.

4) Remove the side stop plate each from the two cassettes.

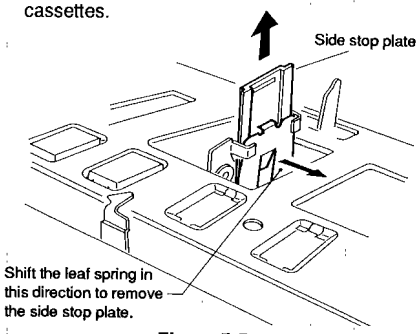

Figure 5-5

5) Remove the two screws that hold the paper size plate in place.

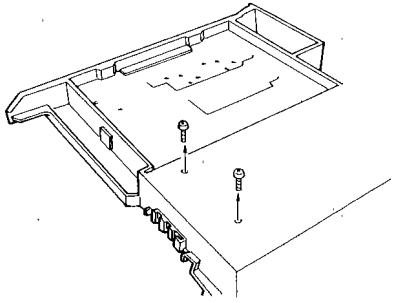

Figure 5-6

6) Slide the paper size plate along the index on the bottom of the cassette to suit the desired paper size.

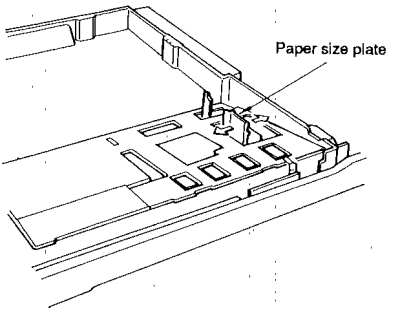

Figure 5-7

7) Place about 100 sheets of paper (fresh out of package, of the desired size) in the cassette, and butt them against the front of the cassette.
8) Keep the side stop plate between the bunch of sheets and size plate as shown, and screw the size plate using a screw; make sure that the size plate is butted against the side stop plate.

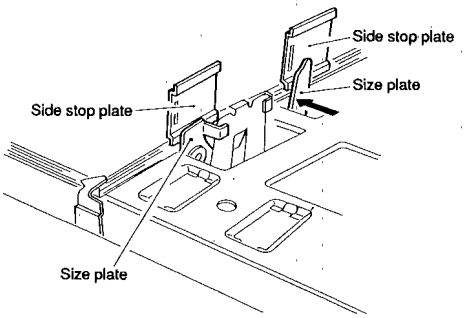

Figure 5-8

9) Fix the side stop plate in its original location.

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10) Set the cassette size roll; see Table 5-2.

Copy paper	1	2	3	4
B5				■
U2			■	
A4			■	■
B5 R		■		
B4		■		
A4 R		■	■	
A3		■	■	■
U1	■			
U1	■			■
U2	■		■	
Letter	■		■	■
STMT	■	■		
Legal	■	■		■
Letter R	■	■	■	
11"X17"	■	■	■	■

U2 Argentine Legal, Foolscap, Government Legal, Folio Australian Foolscap, Officio, Ecuadorean Officio, Bolivian Officio

U1 Government Letter, Argentine Letter, Korean Ledger

Table 5-2

11) Detach and attach the face plate; see Table 5-3.

A3	a b c d
11X17	a b c d
A4	a b c d
Letter	a b c d
Argentine Letter	a b c d
Government Letter	a b c
Korean	a b c
B4	a b c
B5	a b c
A4-R	a b
Letter-R	a b
Argentine Legal	a b
Government Letter-R	a b
Government Legal	a b
Argentine Letter-R	a b
Foolscap	a b
Folio	a b
Australian Foolscap	a b
Officio	a b
Ecuadorean Officio	a b
Bolivian Officio	a b
Legal	a b
Korean Ledger-R	a
B5R	a

Table 5-3

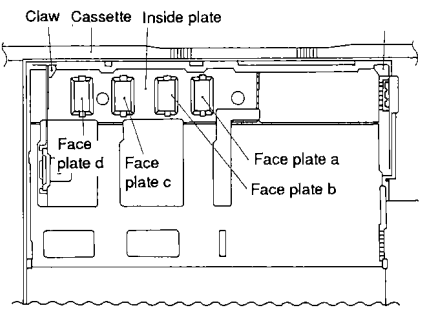

Figure 5-7

12) Attach the size label on the cassette; if the label is not available, use a blank label.

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② Replacing the Cassette Spring

- The copier can be reset for a different size of copies by modifying the cassette spring as shown in Table 5- 4.

Size of paper	Color of spring
A4/A3 11×17/LTR/I	green
A4R/B5R/LTR-R LGL/STMT/II	yellow
B4/B5	red

Table 5-4

I: ARGENTINE LTR
GOVERNMENT LTR
KOREAN
II: ARGENTINE LGL
GOVERNMENT LGL
ARGENTINE LTR-R
GOVERNMENT LTR-R
FOOLSCAP FOLIO
AUSTRALIAN FOOLSCAP
KOREAN-R
ECUADORAN OFICIO
BOLIVIAN OFICIO

1) Remove the two rubber stoppers from the inside plate.

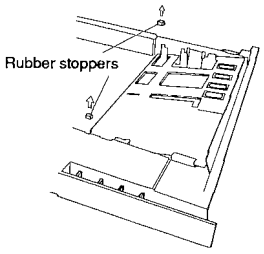

Figure 5-10

2) Remove the inside plate and spring.

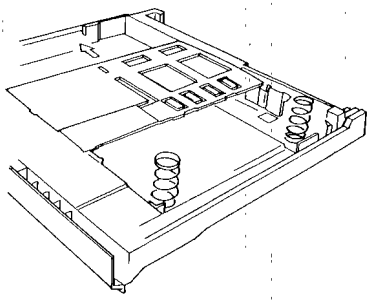

Figure 5-11

3) Change the spring as shown in Table 5-4.
4) Set the inside plate, and attach the rubber stoppers.

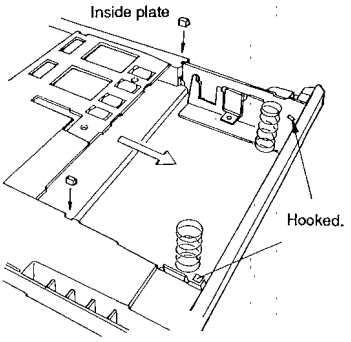

Figure 5-12

Check that the rubber stoppers are correctly attached; further, check that the spring at the rear is correctly set on the fixing behind the inside plate.

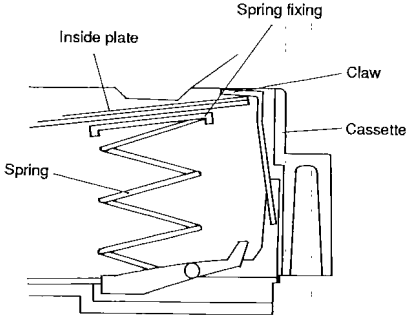

Figure 5-13

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③ Removing the Pick-Up Roller

If the cassette is sized to GOVERNMENT LTR, KOREAN, or KOREAN-R, remove the pick-up rollers shown below (metric rollers).

- GOVERNMENT LTR and KOREAN

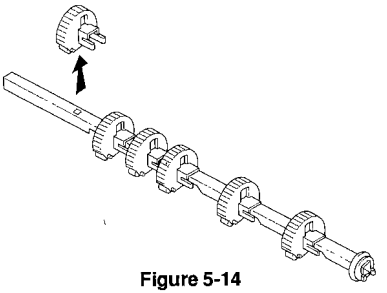

Figure 5-14

- KOREAN-R

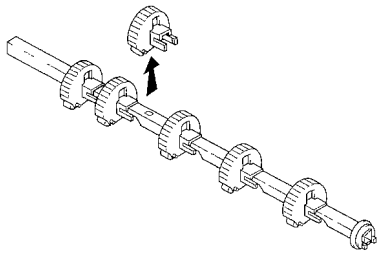

Figure 5-15

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IV. SETTING THE CT UNIT

1) Hold both ends so that the yellow seal (round) is to the front, and turn it in the direction of the arrow about ten times as shown below.

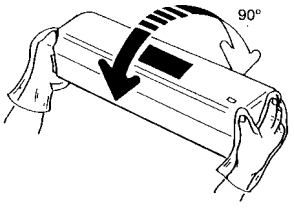

Figure 5-16

2) Take the CT unit from the storage case, and set it in the copier; thereafter, hold the CT unit in place, and pull the yellow tab straight out.

Note:
Do not pull out the orange film.

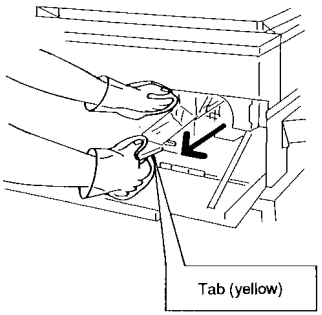

Figure 5-17

3) Put the CT unit back into the storage case, and shake it about ten times in the direction of the arrow.

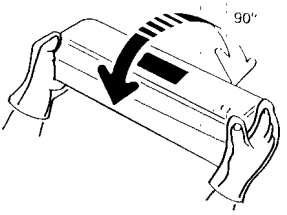

Figure 5-18

4) Shake it in the direction of the arrows about ten times.

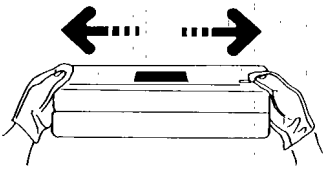

Figure 5-19

5) Set the CT unit in the copier once again, and make test copies in the DIRECT mode; repeat step 4) if the image is uneven.
6) Set the CT unit in the copier, and pull the orange tab straight out; thereafter, close the front door.

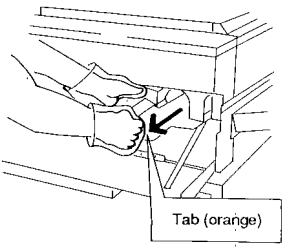

Figure 5-20

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V. RELOCATING THE COPIER

Perform the following when relocating the copier by truck or other means of transportation.

Step	Work	Check	Remarks
1	Remove the drum unit.	Put the drum unit in a box for transport.	
2	Fix the scanner and lens in place.		
3	Tape the corona units and feeder unit release lever in place against vibration.		
4	Tape the front door and delivery unit.		
5	Place a sheet of A3 or 11"X17" paper on the copyboard glass, and tape the copyboard cover.		

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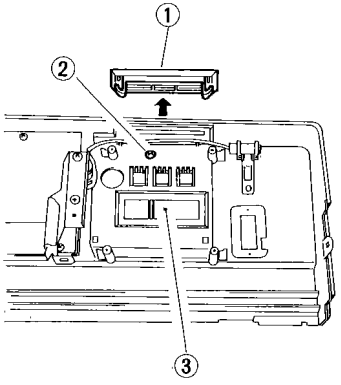
VI. SETTING CONTROL CARD V

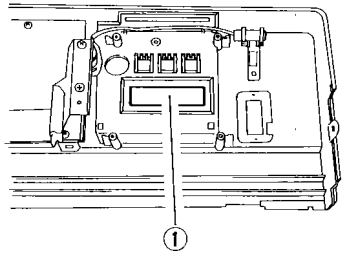
1) Open the front door, and remove the inside cover.
2) Remove the control panel; see p. 4-4.
3) Turn over the control panel, remove the screw that holds the face lid in place.
4) Remove the face plate.



① Mounting screw ③ Face plate
② Face lid

Figure 5-21

5) Remove the protection sheet from the indicator unit of Control Card V.
6) Place the clear sheet over the hole of the indicator unit.

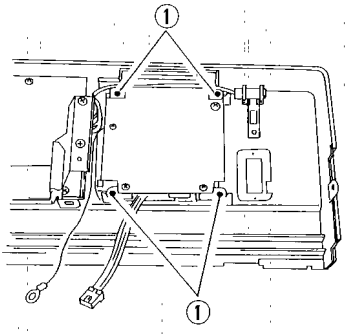


① Hole

Figure 5-22

7) Fix Control Card V on the control panel using four mounting screws.

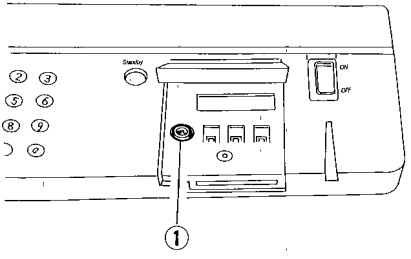
   Slide a card into Control Card V, and fix Control Card V where the card can be slid in and out easily.



① Holes for mounting screws

Figure 5-23

Check that the connector for the printer is found at the center of the hole.



① Connector for printer

Figure 5-24

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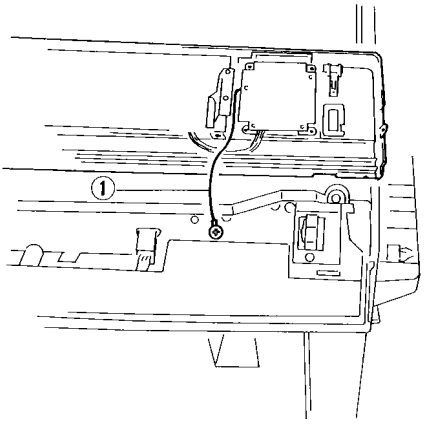
8) Attach the grounding wire for Control Card V.

Note:
Keep the grounding wire as far as possible from the DC harness.

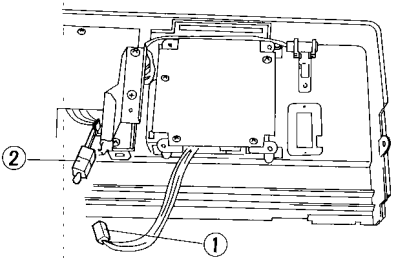


① Grounding wire ② DC harness

Figure 5-25

9) Disconnect the shorting connector of the control panel shown in Figure 5-26.

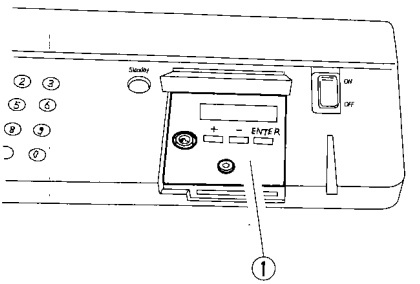
10) Connect the 4P connector of Control Card V and the 4-P connector of the control panel on the copier side.



① 4P connector ② Shorting connector

Figure 5-26

11) Mount the control panel on the copier; then, arrange the grounding wire of Contral Card V using a harness band.
12) Remove the protection sheet from the control panel guide plate of Control Card V.
13) Attach the control panel guide plate of Control Card V on the control panel of the copier.



① Guide plate

Figure 5-27

14) Turn the copier ON, and check the operation of Control Card V.
15) Attach the inside right cover.

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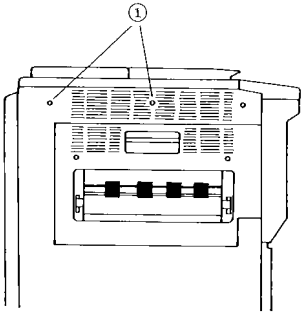
VII. ATTACHING THE DOCUMENT HOLDER

1. NP2020

The document holder may be attached to the left or right of the copier; the following represents attachment of the holder on the left cover side.

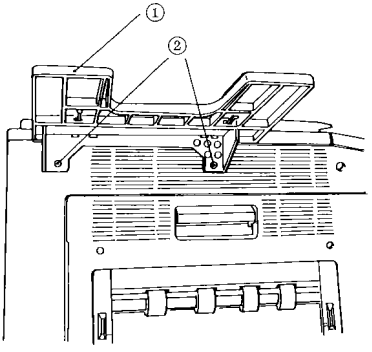
1) Remove the two screws of the left cover.



① Screws (not used)

Figure 5-28

2) Attach the document holder.



① Document holder
② Mounting screw (accessory)

Figure 5-29

2. NP2120

You may choose to attach the document tray on the side of the left cover.

1) Fit the mounting screws in the holes shown, and attach the document tray; see Figure 5-30.

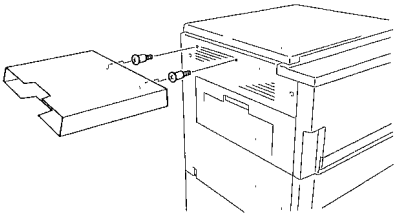


Figure 5-30

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I. PERIODICALLY REPLACED PARTS

Some parts of the copier need to be replaced on a periodical basis; those listed below must be replaced regardless of damage or wear, since they can affect the very operation of the machine when they fail. Replace each part during the scheduled visit closest to the life indicated.

as of July 1992

No.	Parts name	Parts No.	Q'ty	Life	Remarks
1	Ozone filter	FA6-5622-000	1	50,000	or 1 yr.
2	Static eliminator	FF2-3902-000	1	50,000	
3	Transfer corona wire	FY3-0030-000	1	50,000	100V
		FY3-0040-000	1	50,000	115/220/240V
4	Dust-proof filter	FA6-5585-000	1	50,000	or 1 yr.
5	Side seal (upper, short; developing assembly)	FA6-5299-000	2	100,000	
	Side seal (lower, long; developing assembly)	FA5-1769-000	2	100,000	
6	Developing roll (front; developing assembly)	FS2-6019-000	1	500,000	
7	Developing roll (rear; developing assembly)	FS2-6019-000	1	500,000	

Note:
The above are estimates only and subject to change to reflect data from the field.

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II. CONSUMABLES

Some parts of the copier may need replacement over the warranty period because of wear or damage; replace them when they have failed.

as of July, 1992

No.	Parts name	Parts No.	Q'ty	Life	Remarks
1	Oil application roller (fixing assembly)	FA6-5369-000	1	50,000	
2	Scanning lamp (optical unit)	FH7-3113-000	1	100,000	100/115V
		FH7-3114-000	1	100,000	220/240V
3	Pick-up roller (pick-up unit)	FA6-5547-000	12	100,000	
4	Side scraper (developing assembly)	FA5-1768-000	2	100,000	
5	Pre-exposure lamp	FG1-7416-000	1	200,000	
6	Upper fixing roller (fixing assembly)	FA6-5361-000	1	200,000	
7	Separation claw (upper; fixing assembly)	FA6-5433-000	5	200,000	
8	Separation claw (lower; fixing assembly)	FA2-9037-000	5	200,000	
9	Thermistor (fixing assembly)	FH7-7127-000	1	300,000	
10	Insulating bush (fixing assembly)	FA5-2967-000	2	300,000	
11	Fixing heater (fixing assembly)	FH7-4289-000	1	300,000	100V
		FH7-4290-000	1	300,000	115V
		FH7-4291-000	1	300,000	220V
		FH7-4292-000	1	300,000	240V
12	Developing cylinder (developing assembly)	FA6-5297-000	1	300,000	
13	Developing assembly drive gear (developing assembly)	FS2-0870-000	1	300,000	
14	Upper registration roller	FG9-2392-000	1	300,000	
15	Lower registration roller	FA5-2087-020	1	300,000	
16	Scanner cable	FA6-5591-000	1	500,000	
17	Upper fixing roller bushing (fixing assembly)	XG9-0181-000	2	500,000	
18	Lower fixing roller (fixing assembly)	FA5-1917-000	1	300,000	
19	Manual feed pick-up roller (NP2120)	FB1-8581-000	1	100,000	
20	Manual feed separation pad (NP2120)	FC1-9022-000	1	100,000	
21	Upper feeder roller (NP2120)	FC1-7558-000	1	300,000	
22	Lower feeder roller (NP2120)	FG2-5299-000	1	300,000	

Note:
The values above are estimates only and subject to change based on future data.

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III. PERIODICAL SERVICING

Note:
1. **As a rule, conduct the following work every 20,000 copies.**
2. **Check the service record before paying a visit, and take replacement parts if necessary.**

Step	Work	Checks	Remarks
1	Meet the operator.	Check the condition.	
2	Record the counter reading.	Check the faulty copies.	
3	Make test copiers; in the DIRECT, REDUCE, ENLARGE, page separation modes.	Check the following: a. image for density b. background for dirt c. characters for clarity d. leading edge for margin e. left and right sides for margin f. fixing, registration, and back of copy for dirt g. abnormal sound h. counter operation	Standards: 1.5 ±0.5 mm/0.06±0.02 in (DIRECT) Standards: 2.5 ±1.5 mm/0.1±0.06 in (DIRECT)
4	Clean the corona units.		Dry wipe the units using lint-free paper; thereafter, clean them using an alcohol solution. Do not set unless dry.
5	Clean the static eliminator and feeder unit.		Clean the eliminator using the cleaning brush (accessory).
6	Clean the fixing unit and delivery unit: • paper guide plate • separation claw (upper, lower) • static eliminator (brush)		 Use a solvent. Use a solvent.
7	Conduct periodical servicing according to the number of copies processed; see p. 6-4.		
8	Clean the copyboard cover and copyboard glass.		
9	Make test copies.		
10	Make sample copies.		
11	Put the sample copies in order, and clean up the area around the copier.		
12	Record the counter reading.		
13	Fill out the Service Sheet, and report to the operator.		

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IV. PERIODICAL SERVICING CHART

Note:
Do not use solvents or oils other than those specified.

▲: Clean ●: Replace ×: Oil □: Adjust ○: Check

Unit	Parts	Interval				Remarks
		every 20,00 copies	every 50,000 copies	every 100,000 copies	every 500,000 copies	
Externals	Copyboard glass	▲				Use an alcohol solution.
	Ozone filter		●			Or, replace after 1 yr.
Scanner drive unit	Scanner rail		×			Use an alcohol solution; thereafter, oil it.
Feeder unit	Transfer guide unit	▲				Use a moist cloth.
	Feeder belt	▲				
	Feeder mount	▲				
Optical unit	Copyboard reflecting plate	▲				Use a blower brush; if dirt persists, use an alcohol solution. Use the special tool (accessory) for No. 5 and 6 mirrors.
	Side reflecting plate (for illuminating documents)	▲				
	Mirrors (No. 1 through No. 6)	▲				
	Lens	▲				
	Dust-proof glass	▲				
	Dust-proof filter		●			Or, replace after 1 yr.
Corona unit	Primary corona wire	▲				
	Transfer corona wire (transfer corona unit)		● (▲)			Use lint-free paper; thereafter, use an alcohol solution.
	Static eliminator	▲	●			Use the cleaning brush (accessory).
Developing assembly	Developing roll (front, rear)	▲			●	Use an alcohol solution.
	Side seal (front, rear)			●		
Fixing assembly	Upper fixing roller	▲				Use cleaning oil.
	Lower fixing roller	▲				
	Paper guide plate	▲				Use a solvent.
	Separation claw (upper, lower)	▲				

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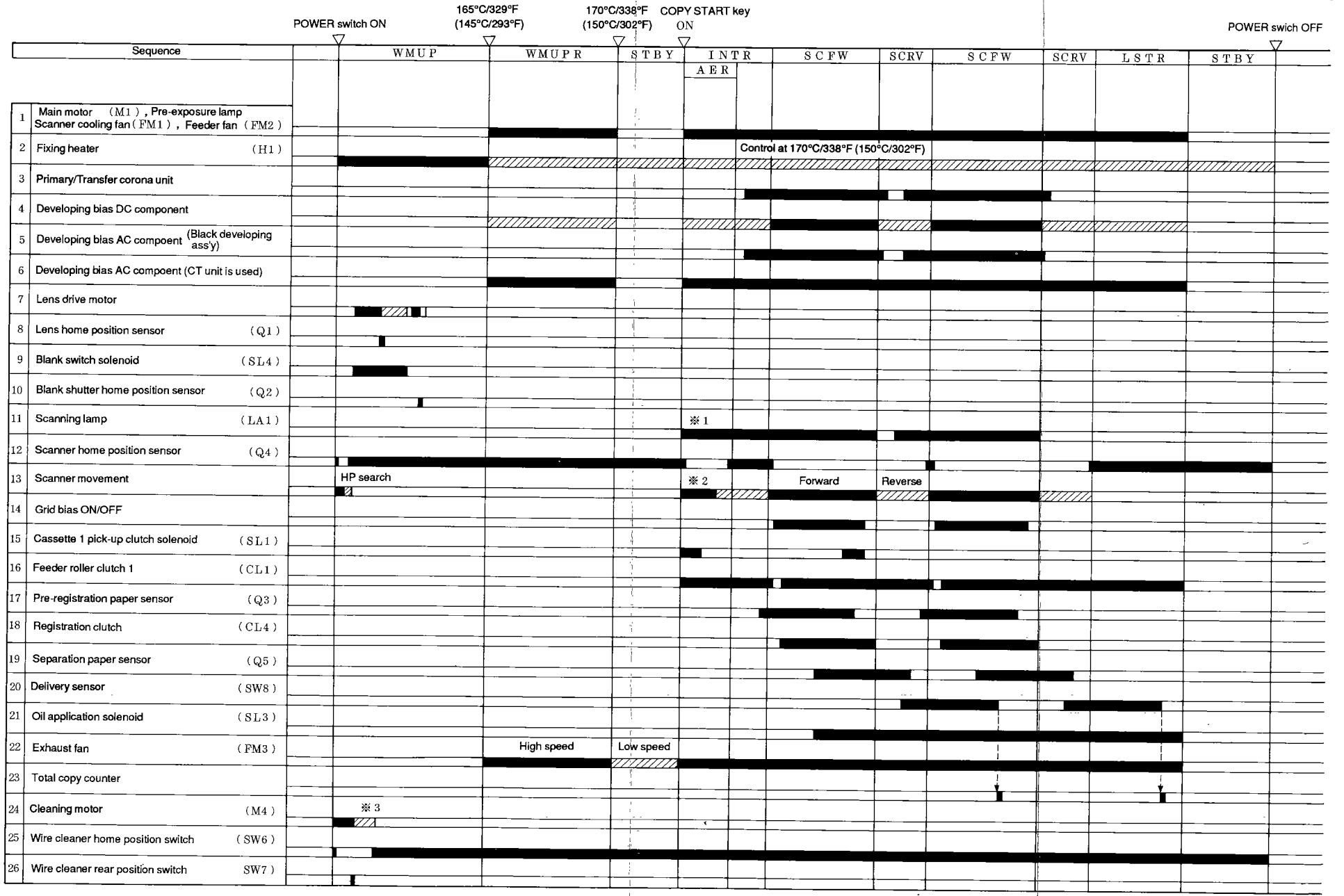
1. GENERAL TIMING CHART



※1 : ON only in AE

※2 : Scanner moves only in AE mode.

※3 : At time of power-on, cleaning motor goes ON if fixing temperature is 100°C or less.

Values in parenthese represent use of CT unit.

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2. SIGNALS AND ABBREVIATIONS

Signals	
ACBON	AC BIAS ON command
ACOFF	AC POWER OFF command
AE	AE SENSOR OUTPUT signal (Analog)
AEGIN	AE SENSOR GAIN signal (Analog)
BTEP	BLACK TONER EMPTY signal
CBCC1	COPYBOARD COVER CLOSED signal 1
CBCC2	COPYBOARD COVER CLOSED signal 2
CCNNT	CONTROL CARD CONNECT signal
CCNTD	CONTROL COUNTER DRIVE command
CLCCW	CLEANING MOTOR COUNTERCLOCKWISE command
CLCW	CLEANING MOTOR CLOCKWISE command
CSZ 0	CASSETTE SIZE signal 0
CSZ 1	CASSETTE SIZE signal 1
CSZ 2	CASSETTE SIZE signal 2
CSZ 3	CASSETTE SIZE signal 3
CTD	CT-UNIT DETECTION signal
DCBC	DC BIAS CONTROL signal
DSLD 0	DOCUMENT SIZE LED DRIVE command 0
DSLD 1	DOCUMENT SIZE LED DRIVE command 1
DSLD 2	DOCUMENT SIZE LED DRIVE command 2
DSZ 0	DOCUMENT SIZE DETECTION signal 0
DSZ 1	DOCUMENT SIZE DETECTION signal 1
DSZ 2	DOCUMENT SIZE DETECTION signal 2
FDCL 1	FEED ROLLER CLUTCH DRIVE command 1
FDCL 2	FEED ROLLER CLUTCH DRIVE command 2
FM2D	FAN MOTOR 2 DRIVE command
FM3D	FAN MOTOR 3 DRIVE command
GRDON	GRID BTAS ON command
HTRD	FIXING HEATER DRIVE command
HVTON	HVT ON command
LAPON	LAMP ON command
LCPD	LOWER CASSETTE PAPER DETECTION signal
LGHT	LIGHT signal
LHP	LENS HOME POSITION signal
LON	LED ON command
LINT	LIGHT INTERNSITY signal (Analog)
MFPD	MANUAL FEED PAPER DETECTION signal
MMD	MAIN MOTOR DRIVE command
MCD	MULTIFEEDER CLUTCH DRIVE command
MSD	MULTIFEEDER SOLENOID DRIVE command
OILSL	CLEANING ROLLER SOLENOID DRIVE command
PDP	PAPER DETCTION signal
PEXP	PRE-CONDITIONING EXPOSURE LAMP command
PUSL 1	PICK-UP SOLENOID 1 DRIVE command
PUSL 2	PICK-UP SOLENOID 2 DRIVE command
RDC	RIGHT DOOR CLOSED signal
RGCL	REGISTRATION ROLLE CLUTCH DRIVE command
RGPD	REGISTRATION ROLLE PAPER DETECTION signal
SBHP	SHUTTER BLANK HOME POSITION signal
SBSL	SHUTTER BLANK SOLENOID DRIVE command
SCHP	SCANNER HOME POSITION signal
SPPD	SEPARATION PAPER DETECTION signal

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TCNTD	TOTAL COUNTER DRIVE command
TH	FIXING ROLLER SURFACE TERMPERATURE signal
UCPD	UPPER CASSETTE PAPER DETECTION signal
WCHP	CORONA WIRE CLEANER HOME POSITION signal
WCRP	CORONA WIRE CLEANER REAR POSTION signal
ZXDP	ZERO COCC DETECTION signal

Abbreviations

AER	AE ROTATION
INTR	INITIAL ROTATION
LSTR	LAST ROTATION
SCFW	SCANNER FORWARD
SCRV	SCANNER REVERSE
STBY	STANDBY
WMUP	WARM UP
WMUPR	WARM UP ROTATION

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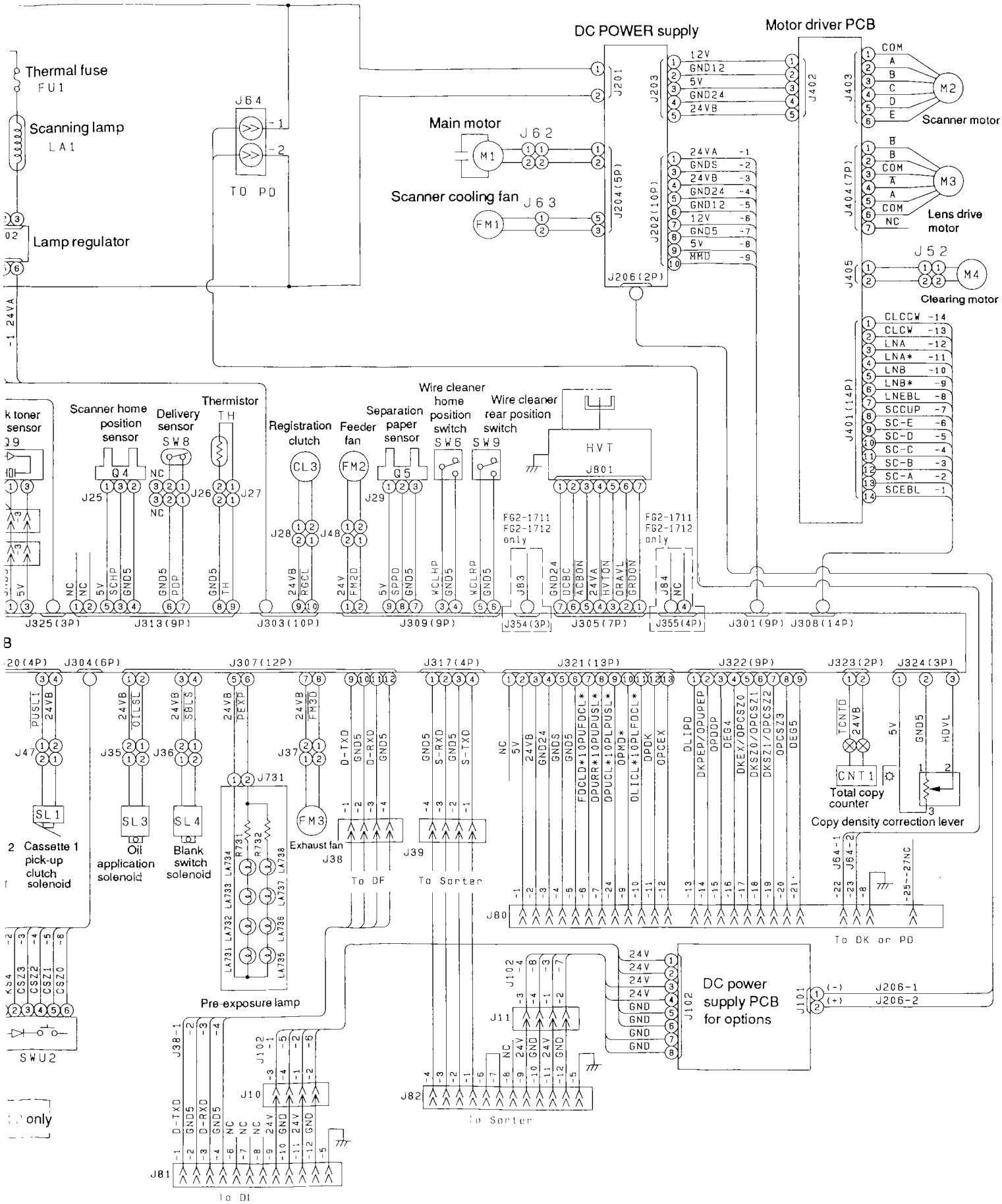
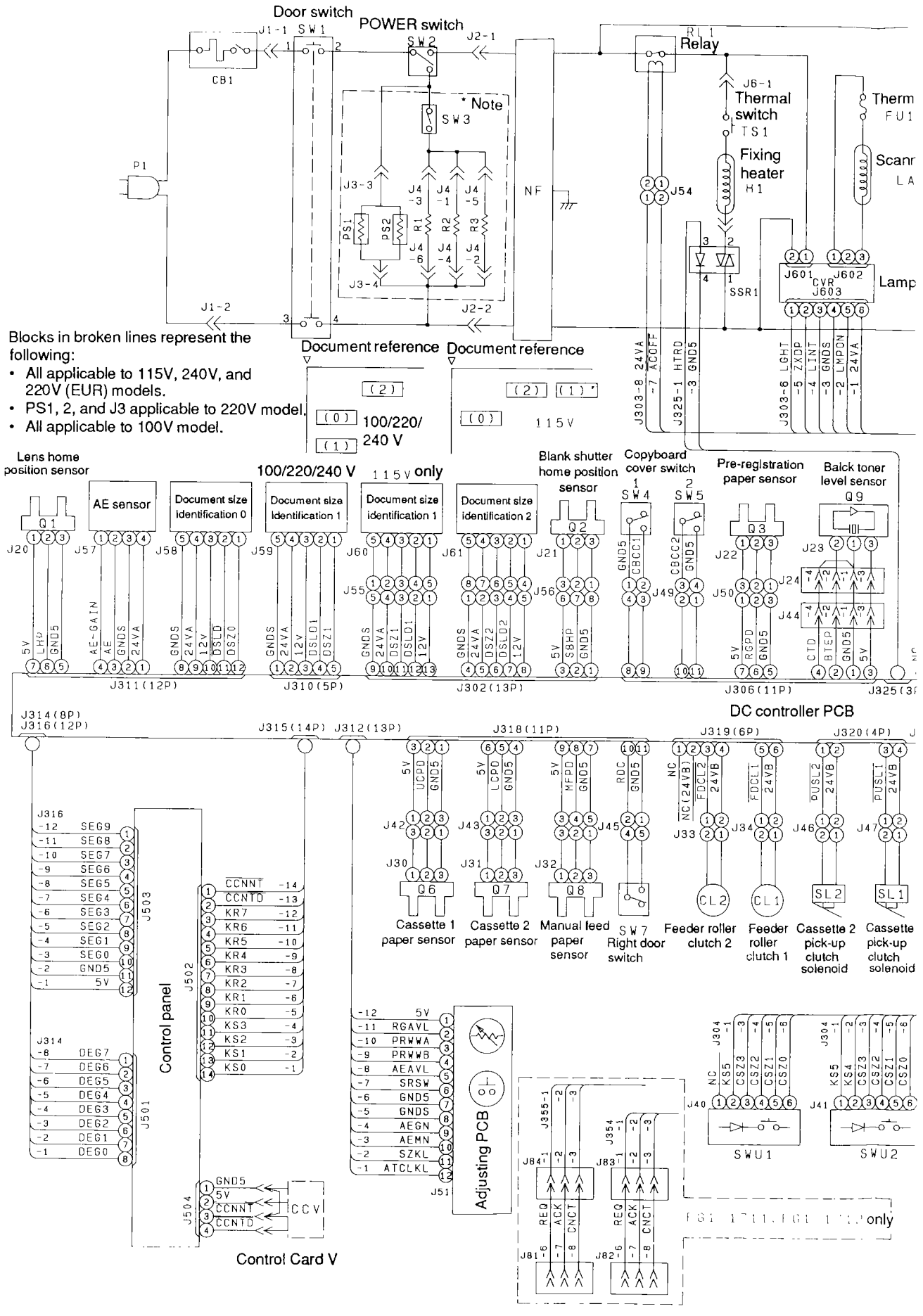
3. GENERAL CIRCUIT DIAGRAM (NP2020)





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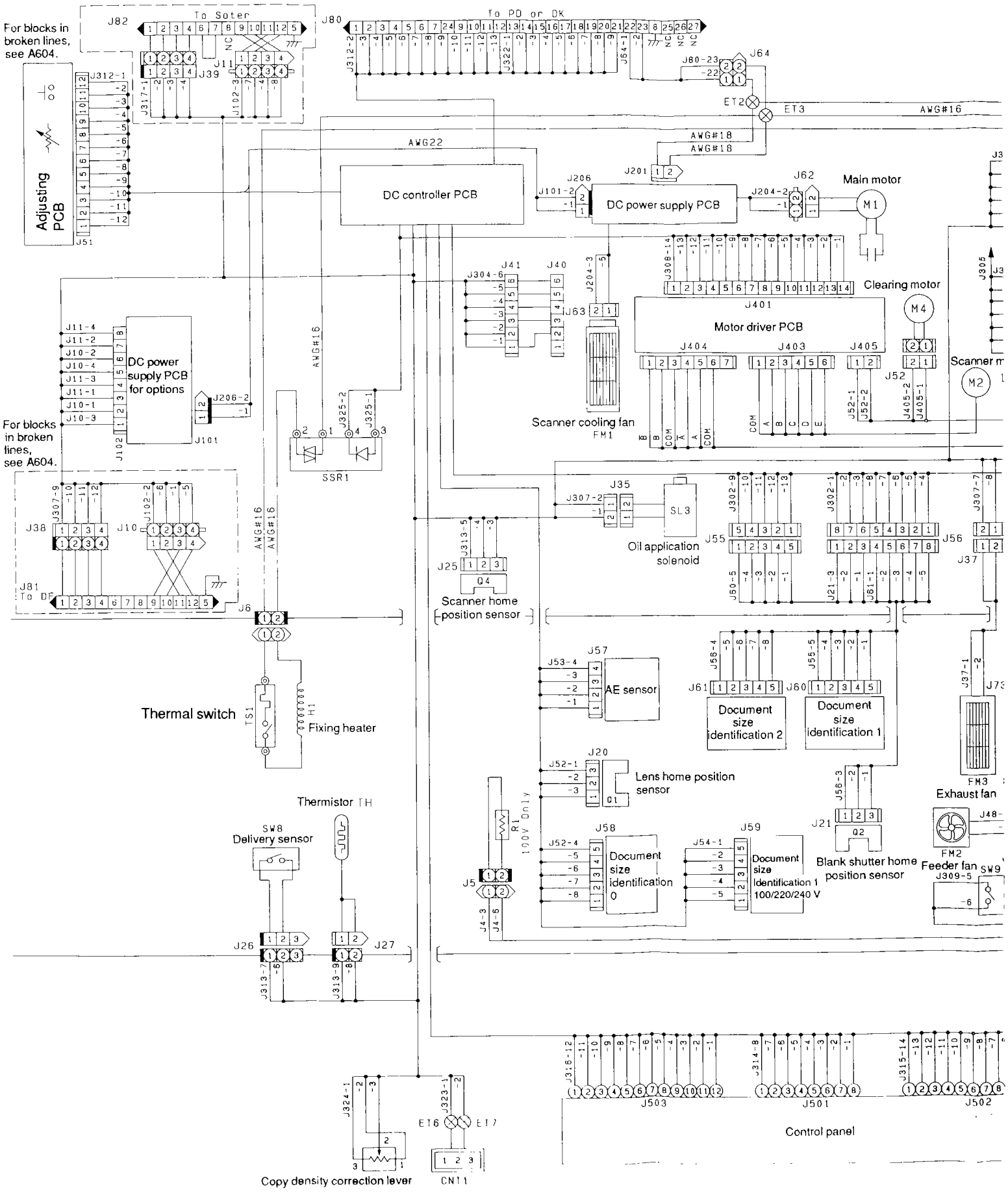
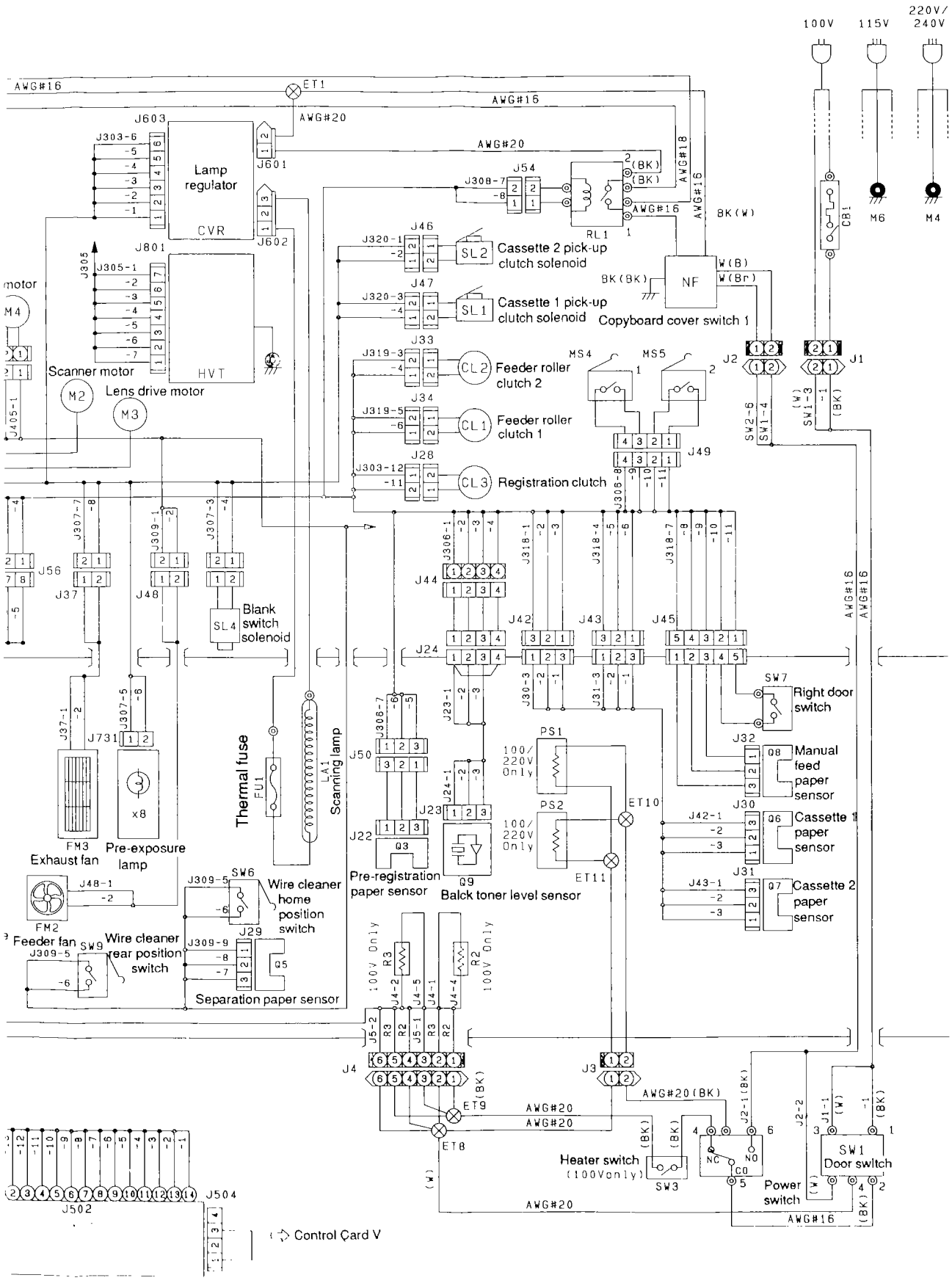
4. WIRING DIAGRAM (NP2020/A601)





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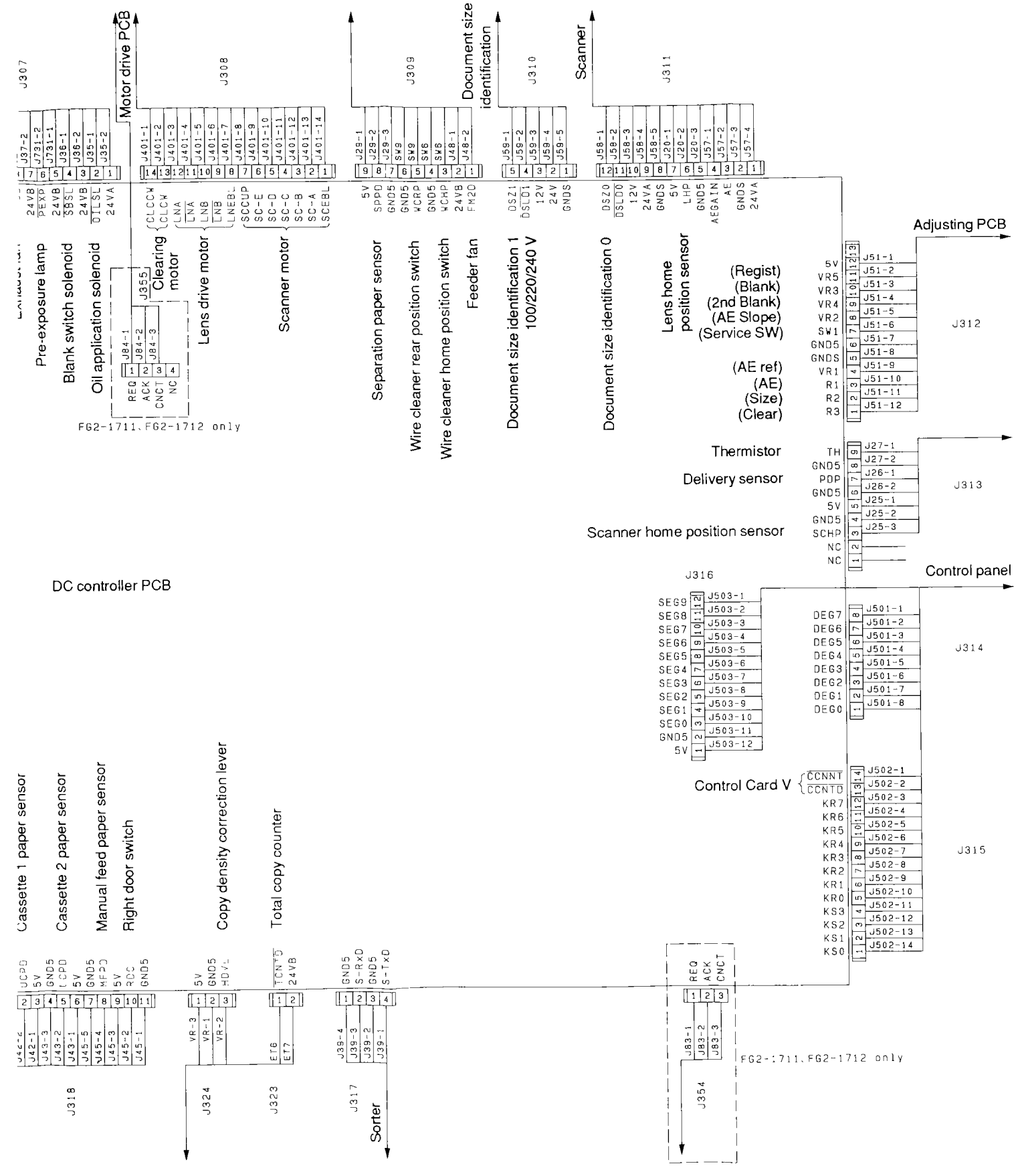
WIRING DIAGRAM (NP2020/A602)



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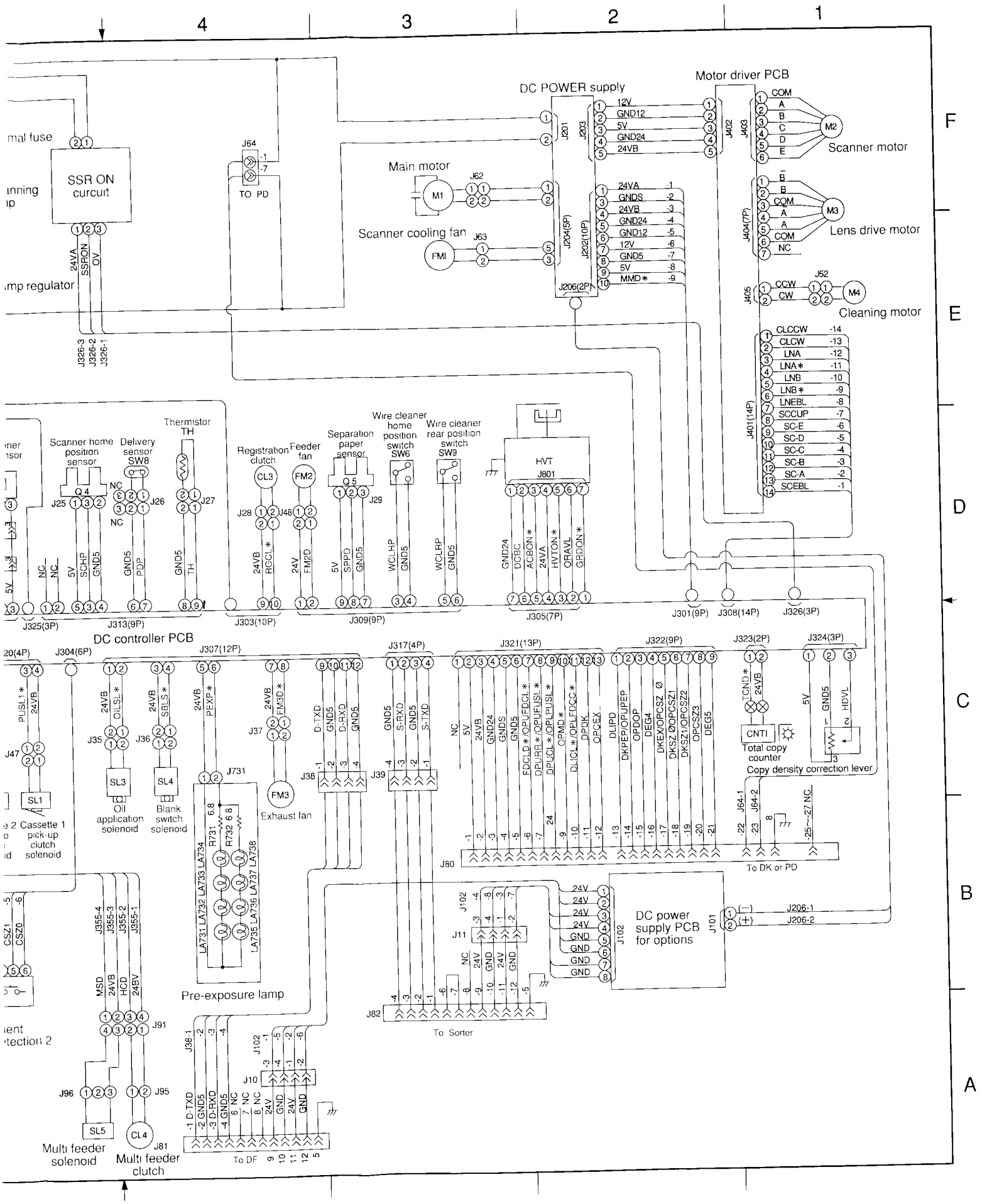
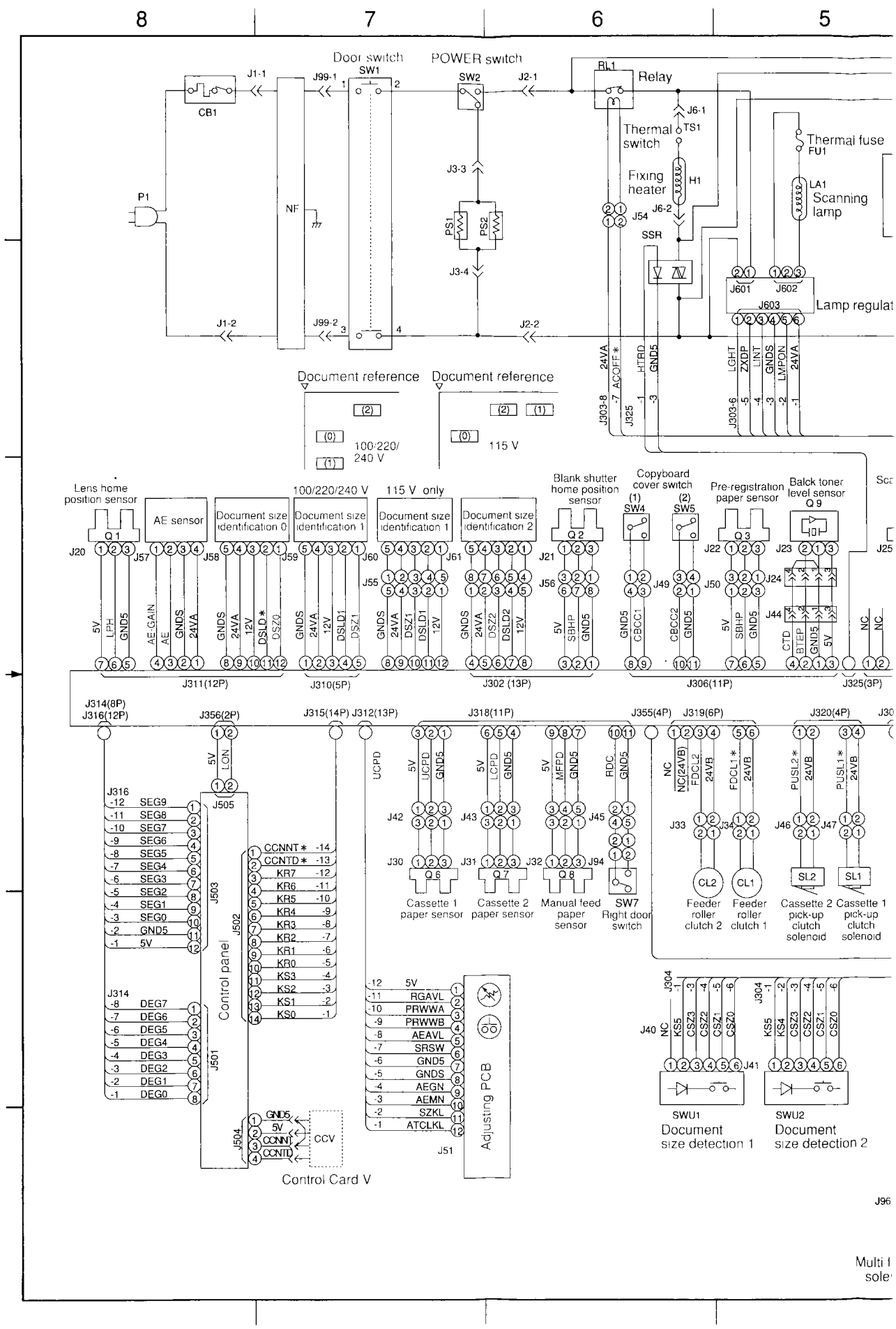
3A. GENERAL CIRCUIT DIAGRAM (NP2120)





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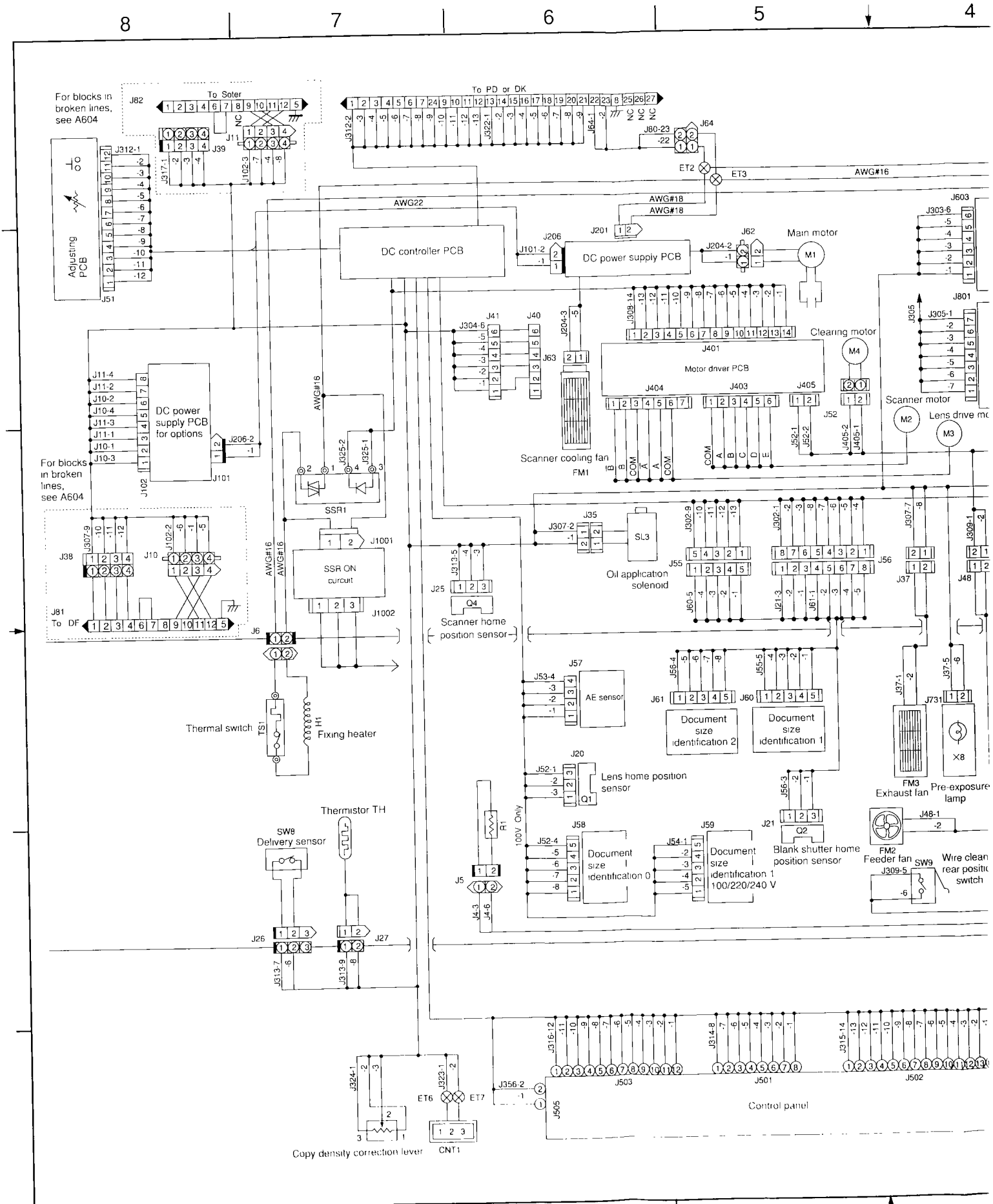
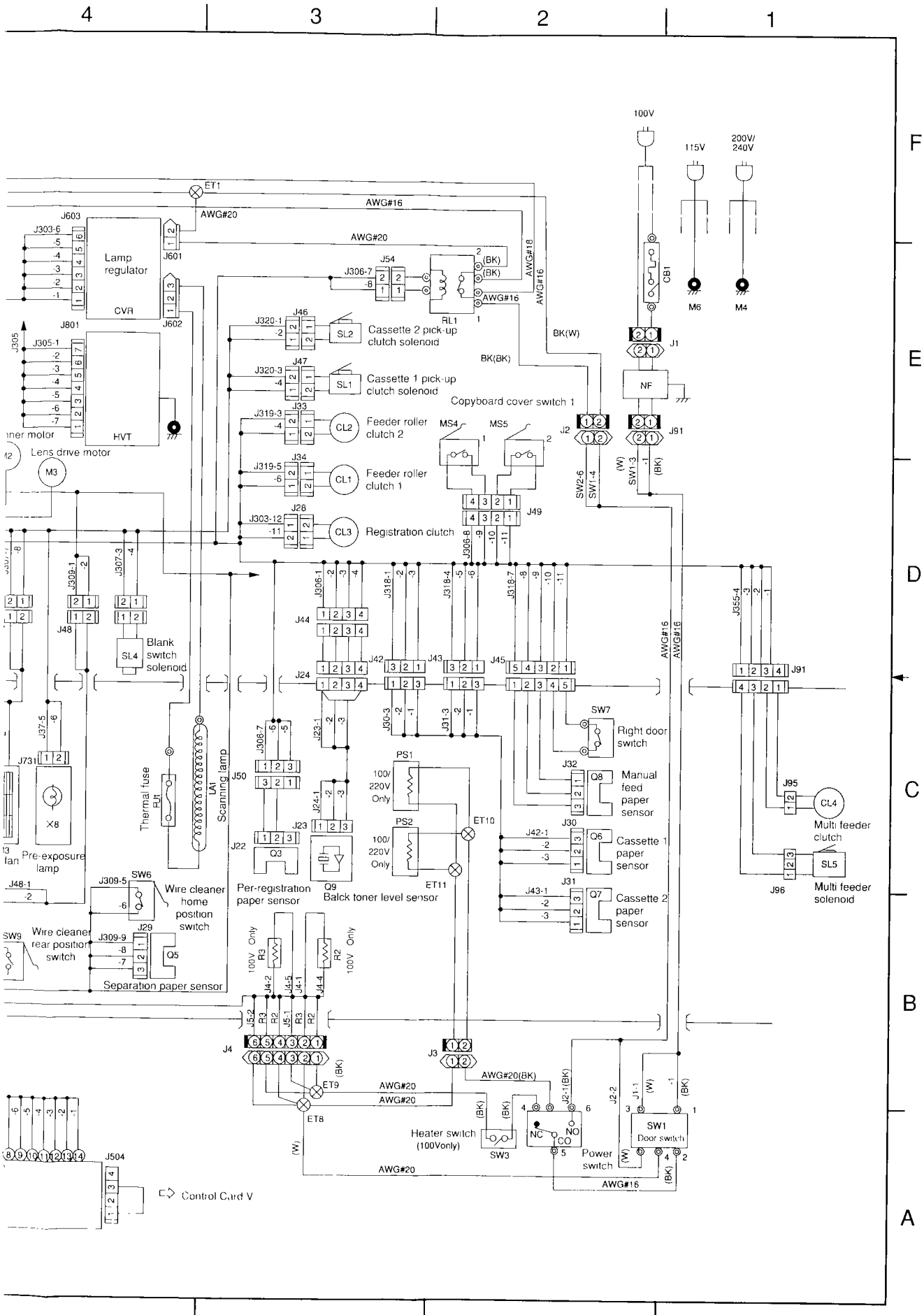
4A. WIRING DIAGRAM (NP2120/A601)





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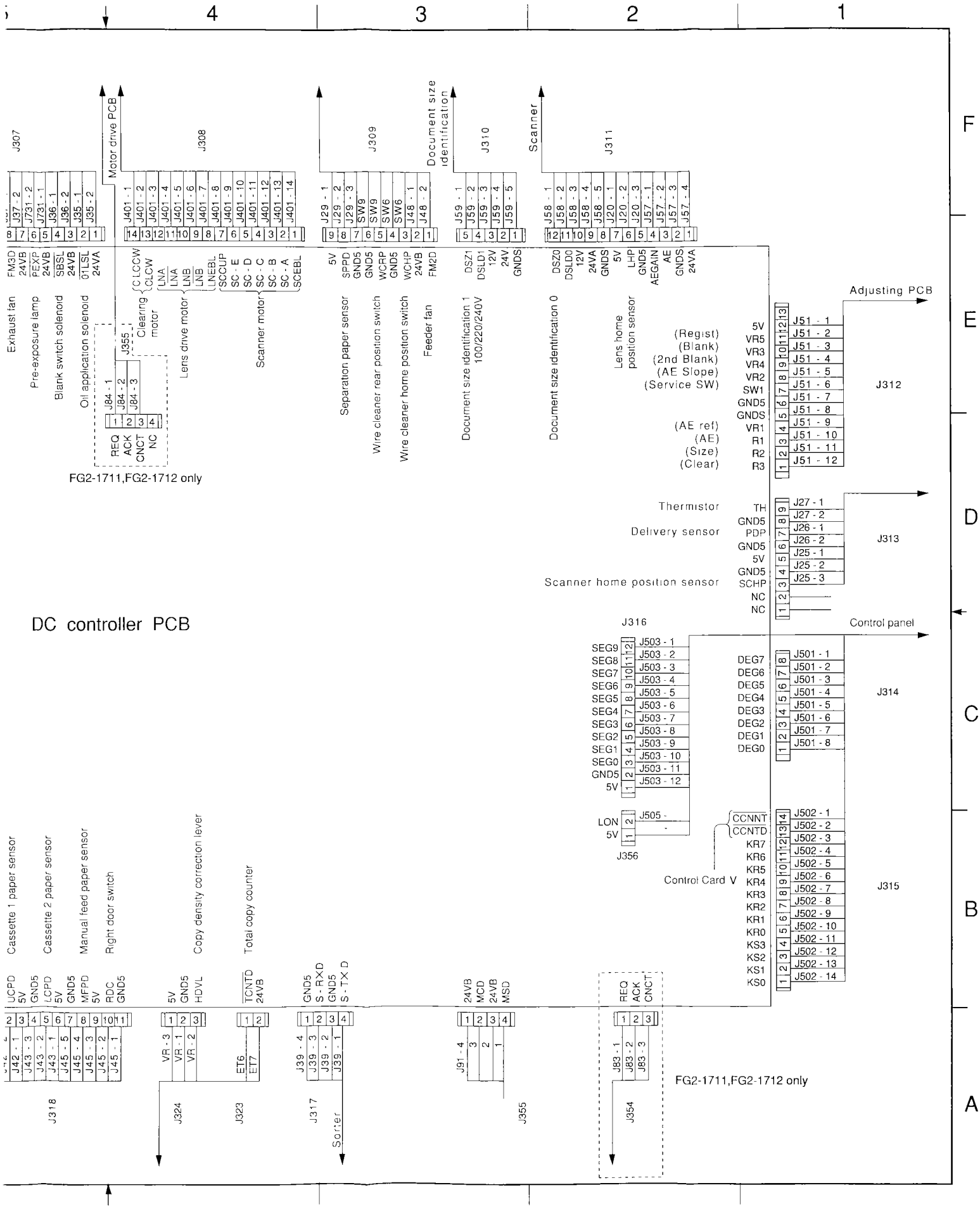
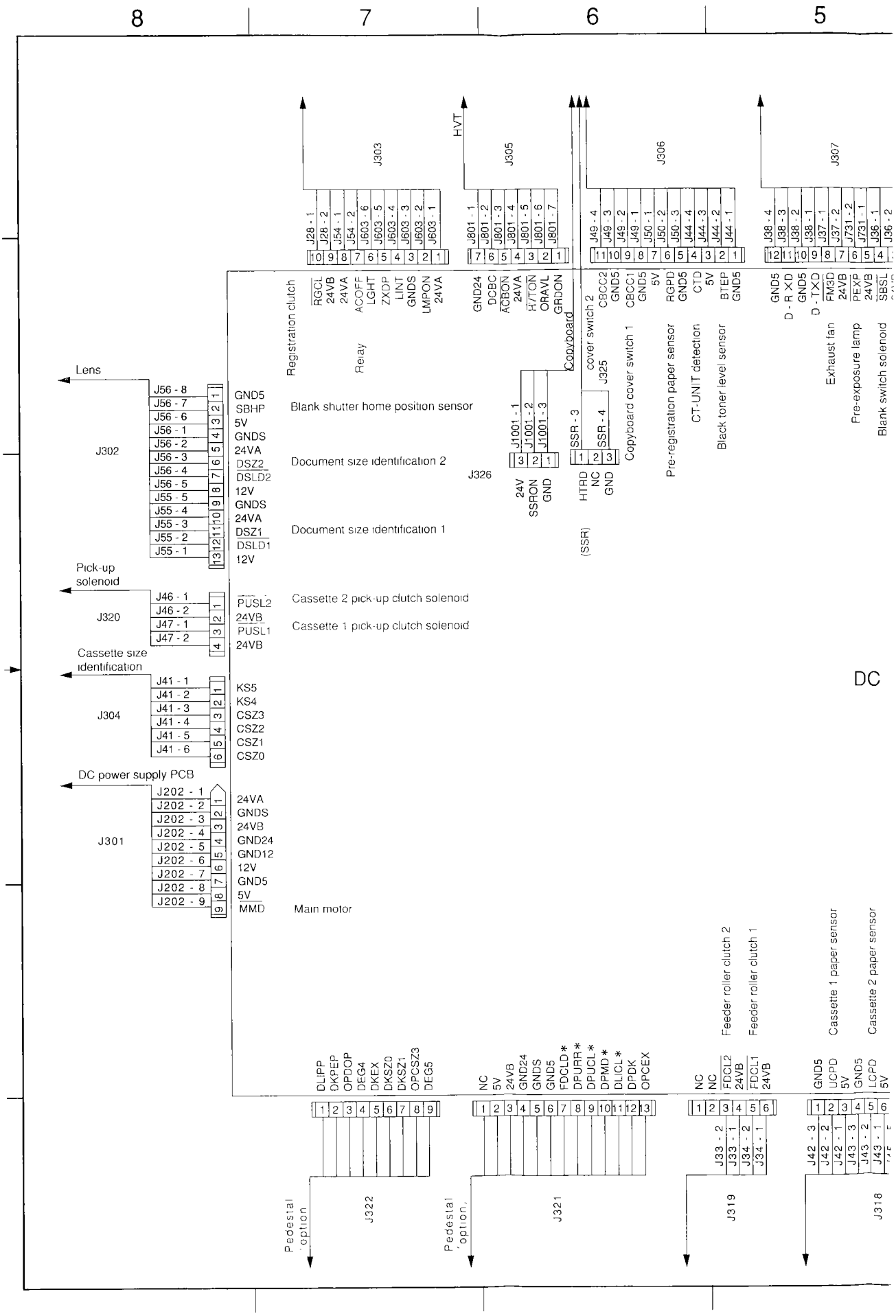

4
3
2
1
F
E
D
C
B
A
Motor drive PCB
J307
J308
J309
Document size identification
J310
Scanner
J311
Exhaust fan
Pre-exposure lamp
Blank switch solenoid
Oil application solenoid
Clearing motor
Lens drive motor
Scanner motor
Separation paper sensor
Wire cleaner rear position switch
Wire cleaner home position switch
Feeder fan
Document size identification 1
100/220/240V
Document size identification 0
Lens home position sensor
(Regist)
(Blank)
(2nd Blank)
(AE Slope)
(Service SW)
(AE ref)
(AE)
(Size)
(Clear)
Adjusting PCB
J312
Thermistor
Delivery sensor
Scanner home position sensor
J313
DC controller PCB
J316
Control panel
J314
J315
J356
Control Card V
Cassette 1 paper sensor
Cassette 2 paper sensor
Manual feed paper sensor
Right door switch
Copy density correction lever
Total copy counter
J318
J324
J323
J317
Sorter
J355
J354
FG2-1711,FG2-1712 only
FG2-1711,FG2-1712 only



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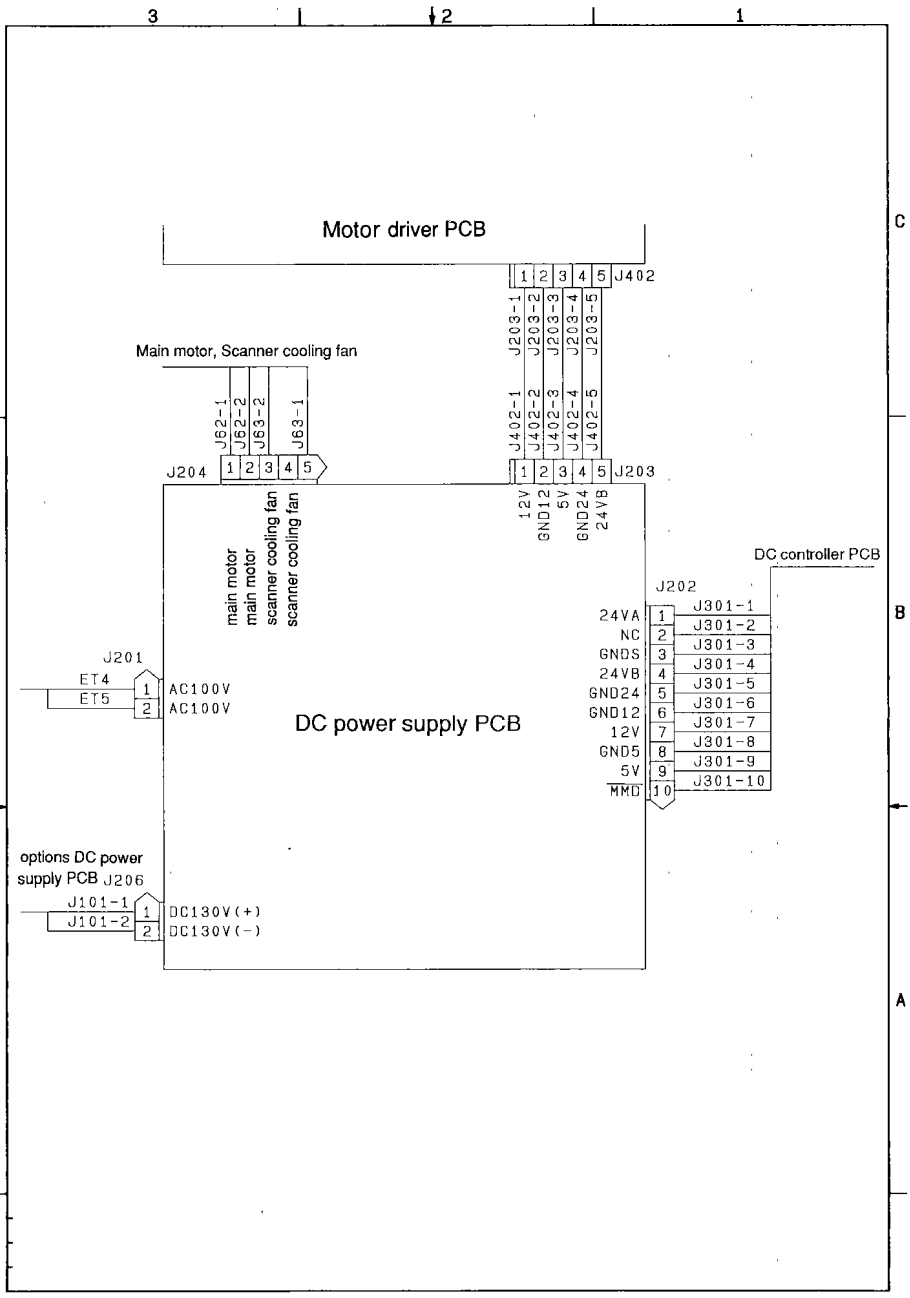
WIRING DIAGRAM (NP2120/A603)



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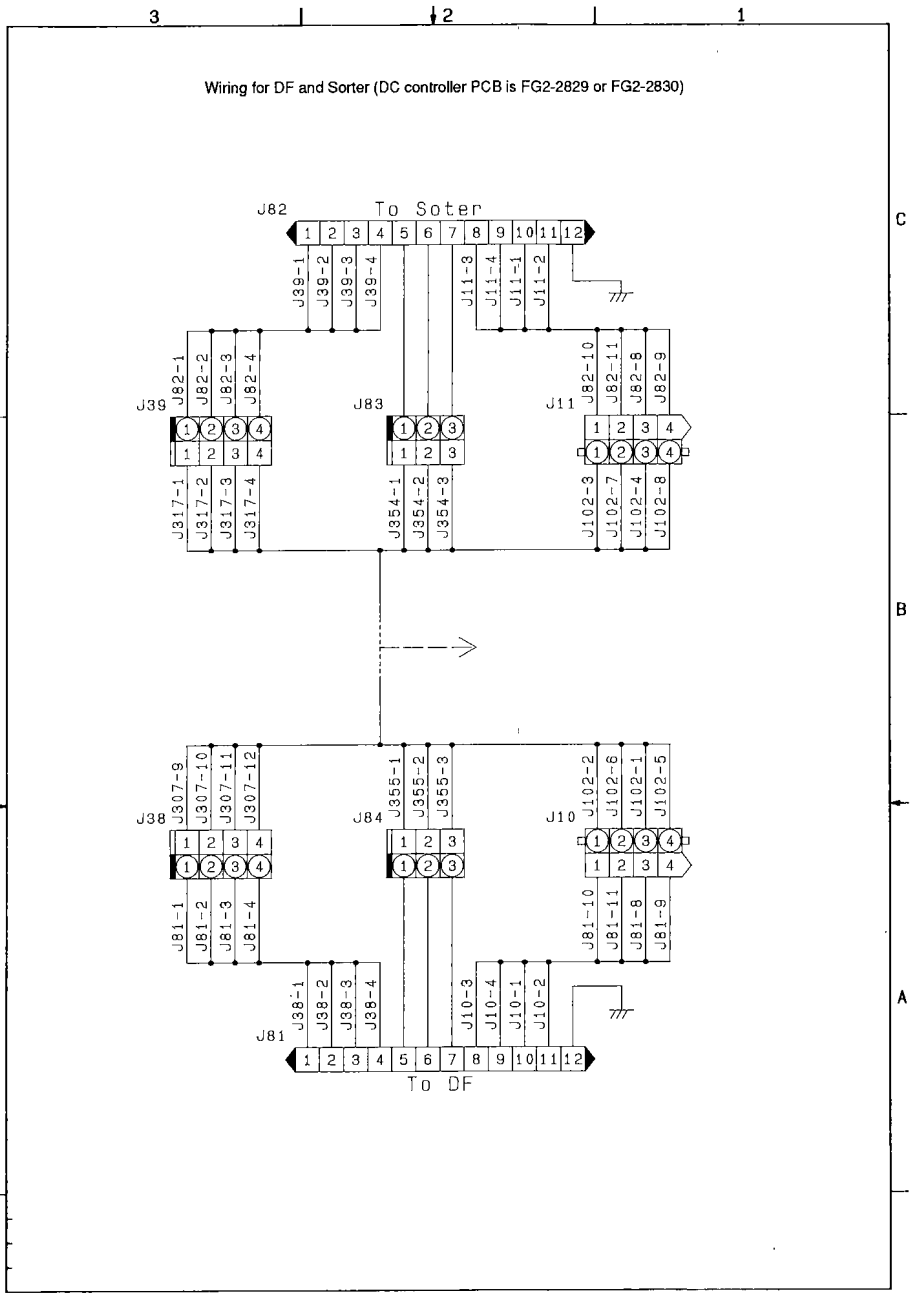
WIRING DIAGRAM (NP2020/A604)



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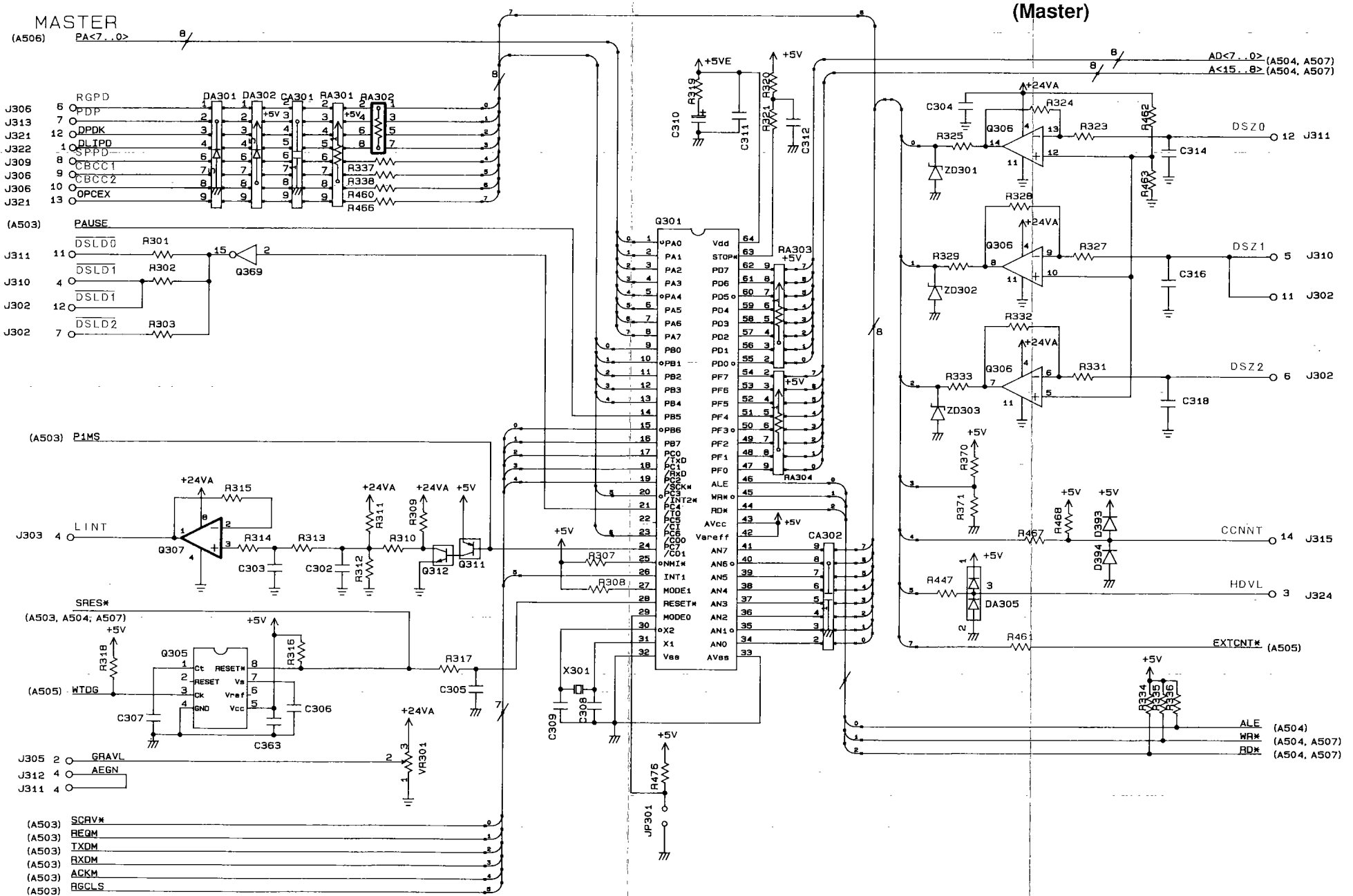

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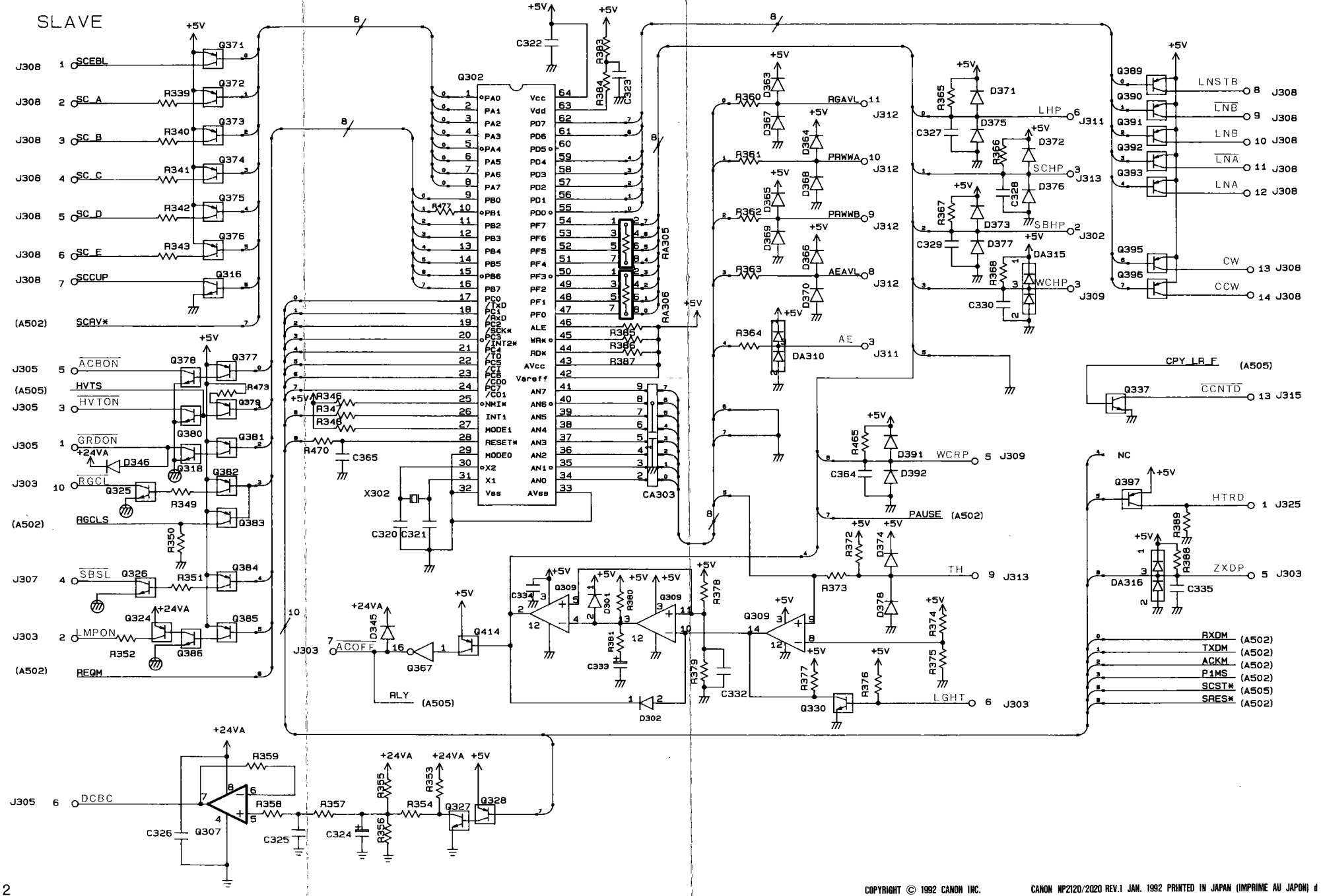
DC CONTROLLER PCB (NP2020/A503)
(Slave)



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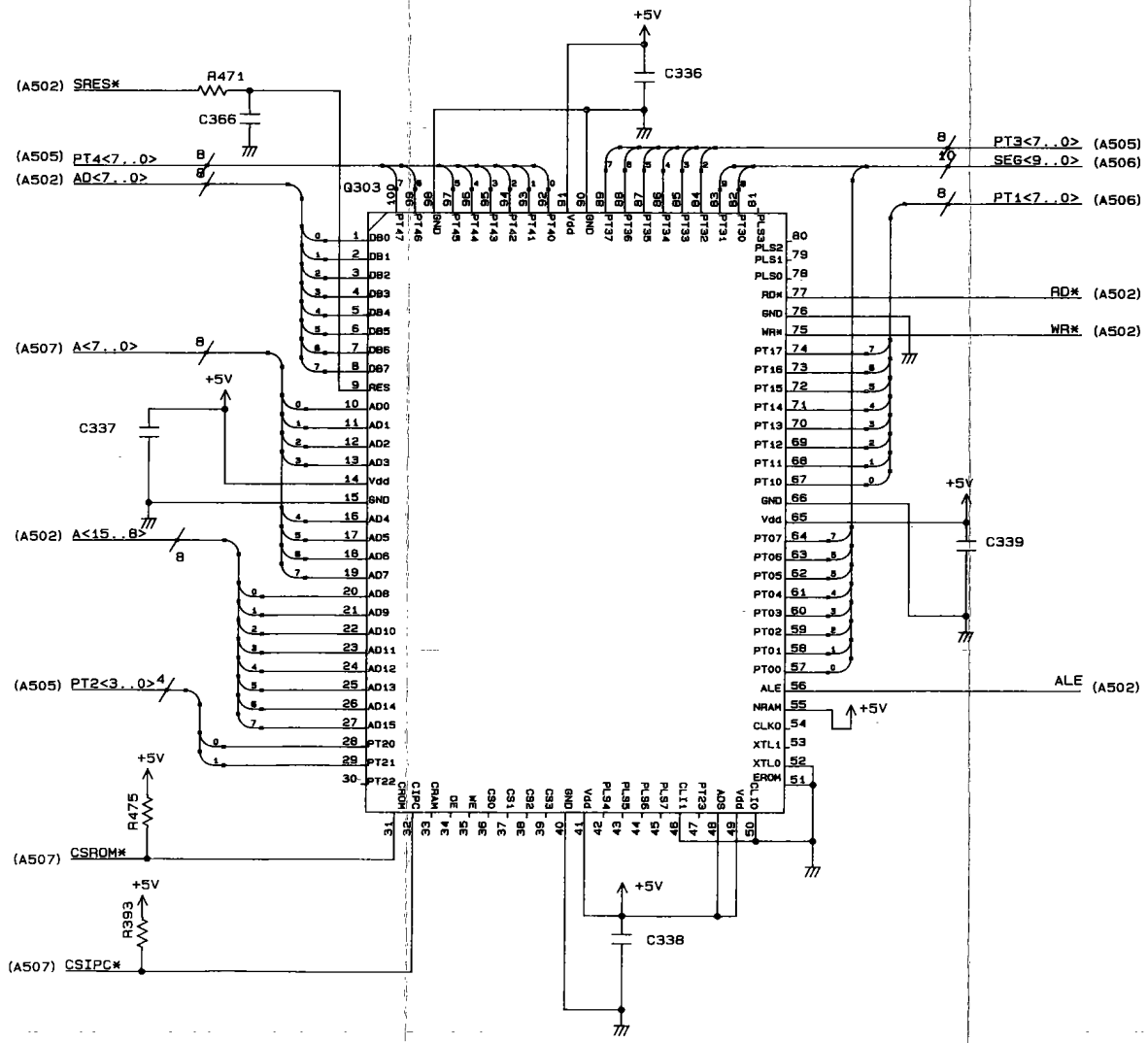
GATE ARRAY



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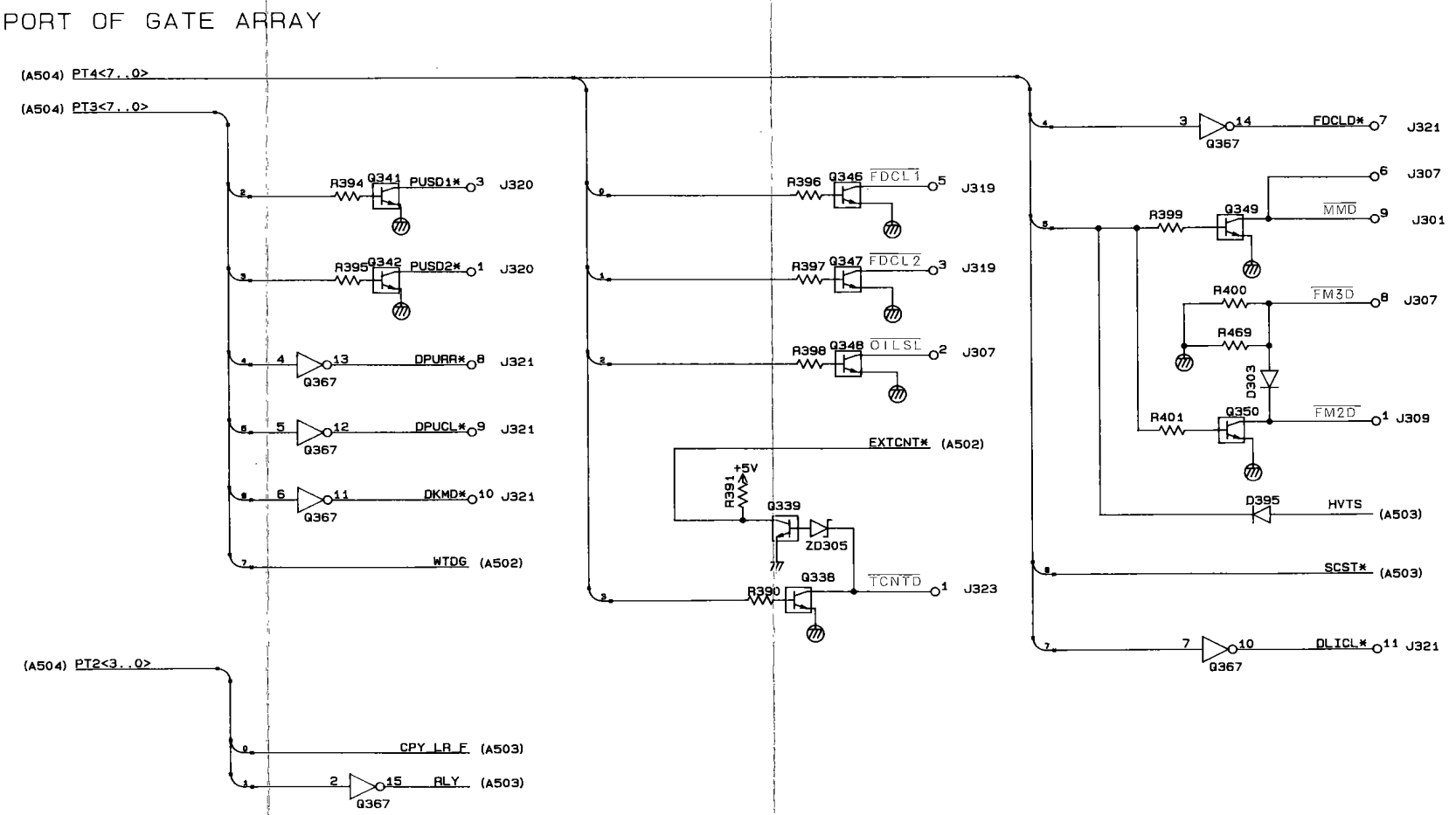

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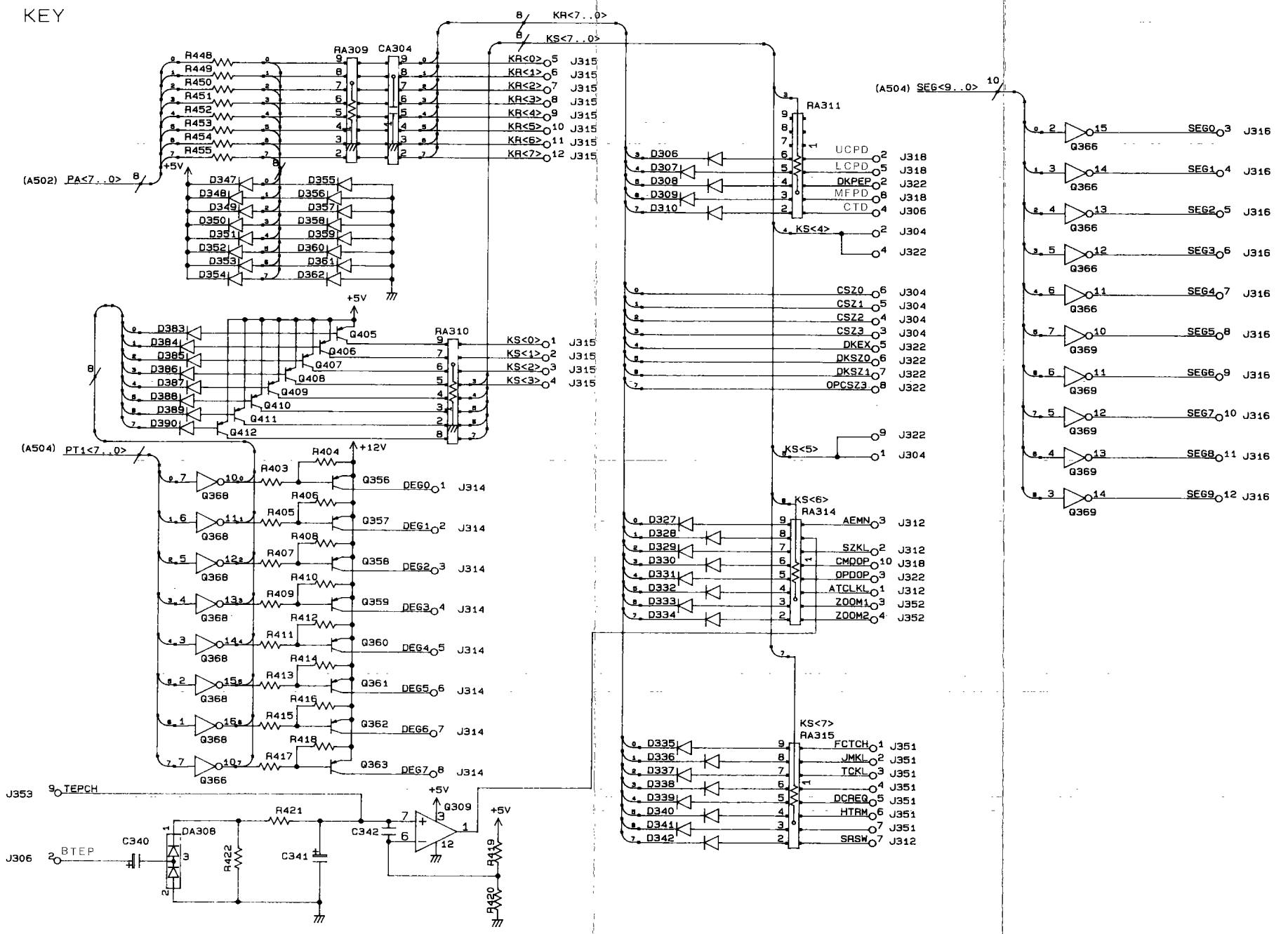

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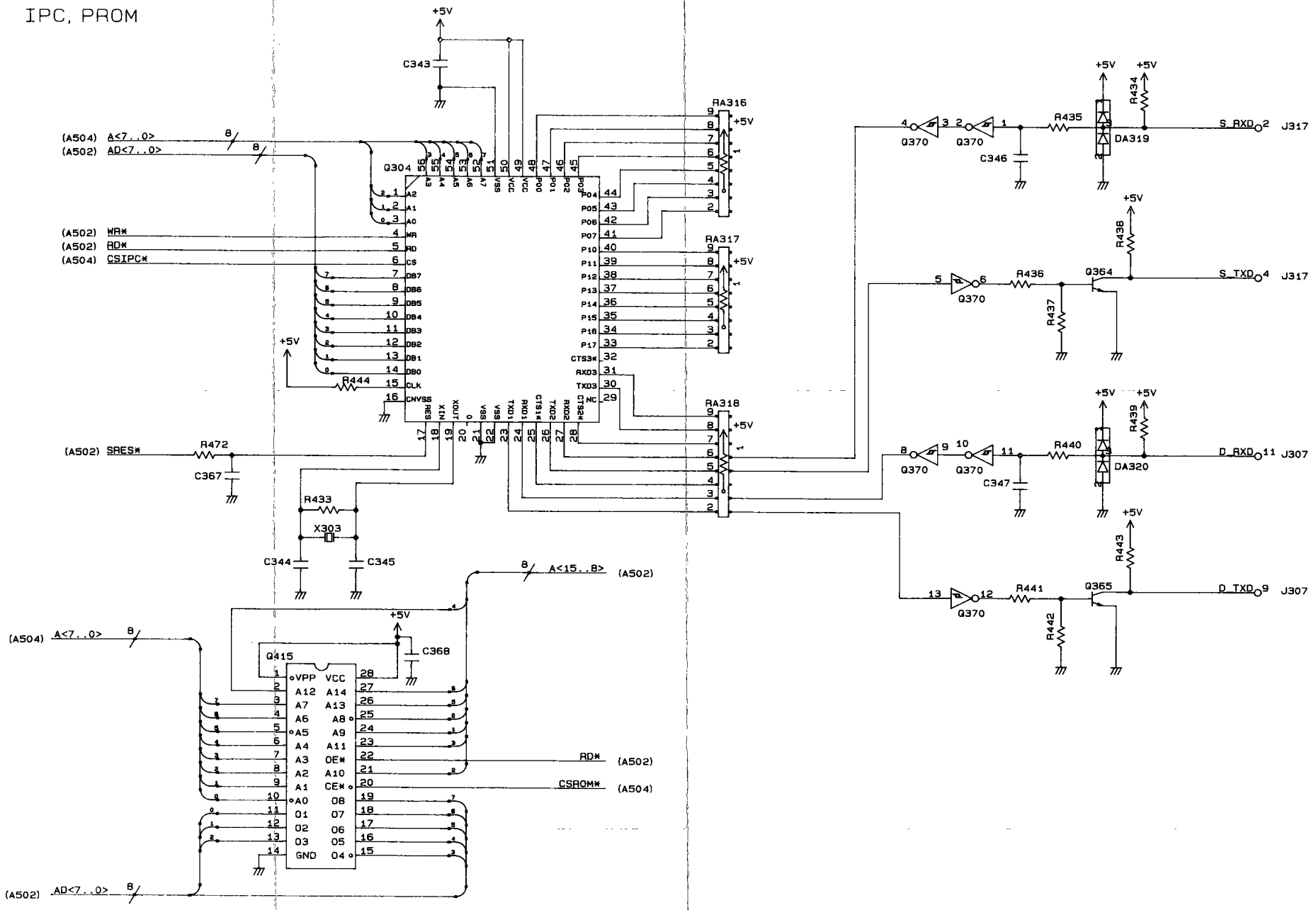
DC CONTROLLER PCB (NP2020/A507)
(IPC)



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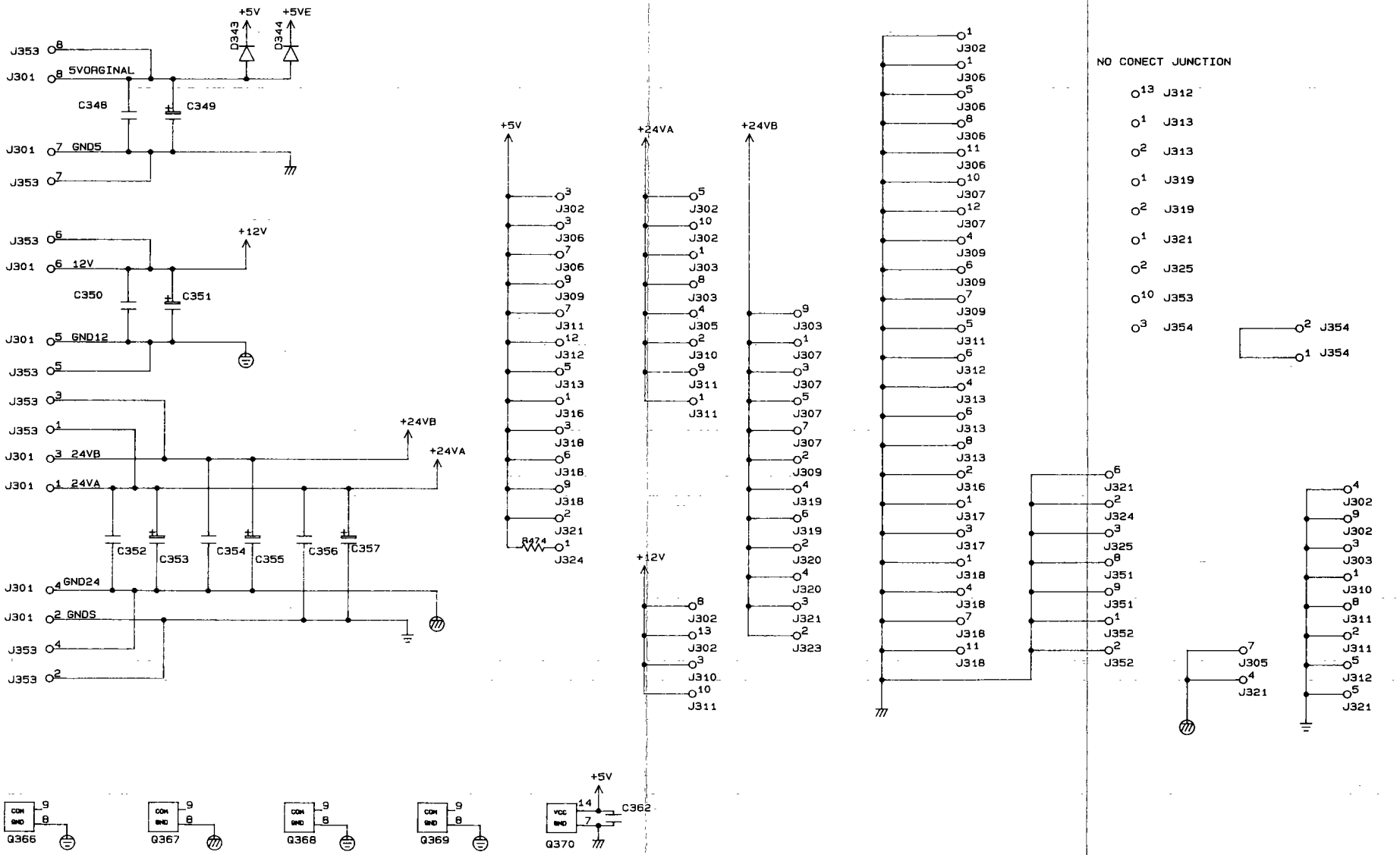

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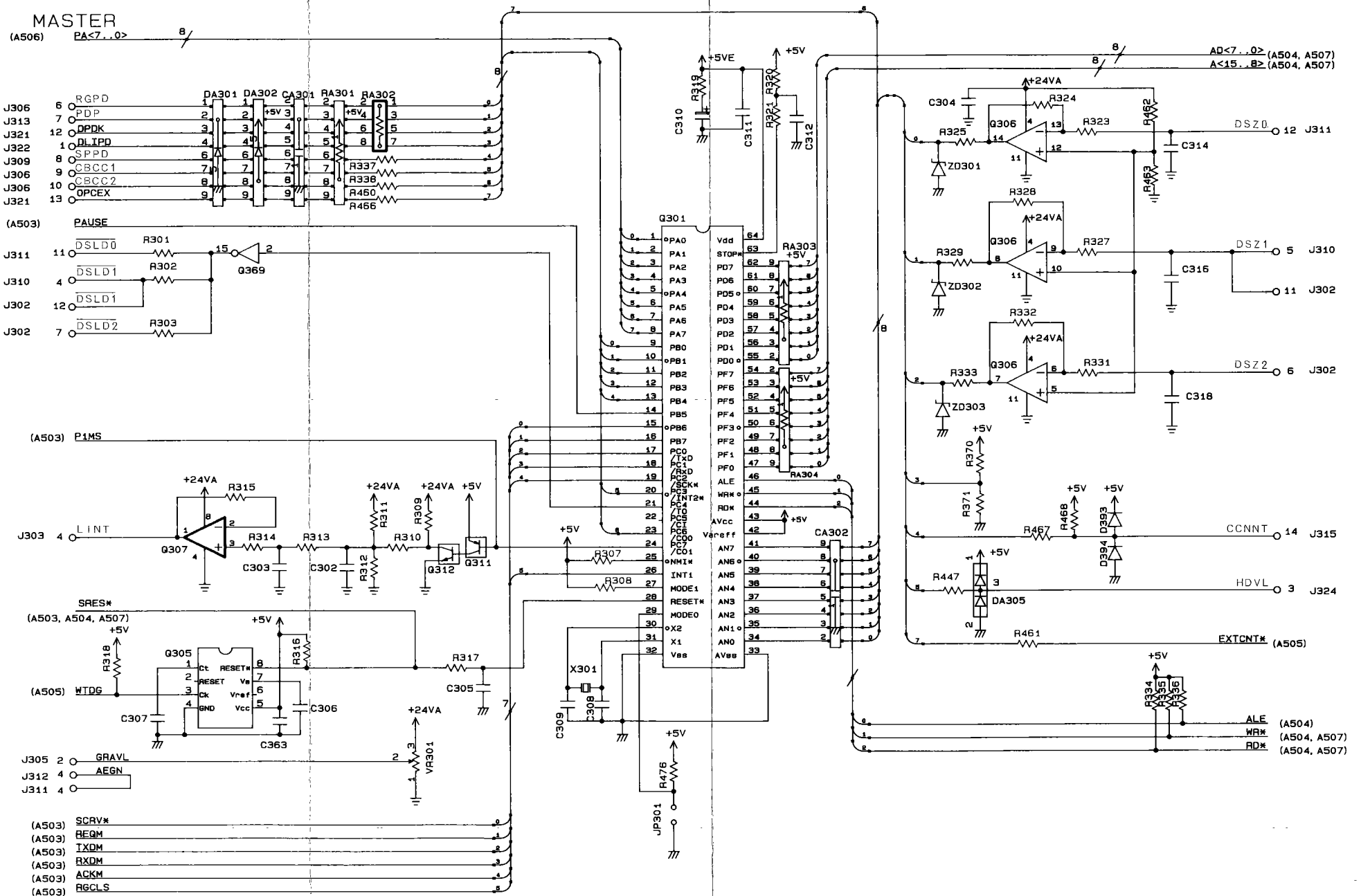
5A. DC CONTROLLER PCB (NP2120/A502)



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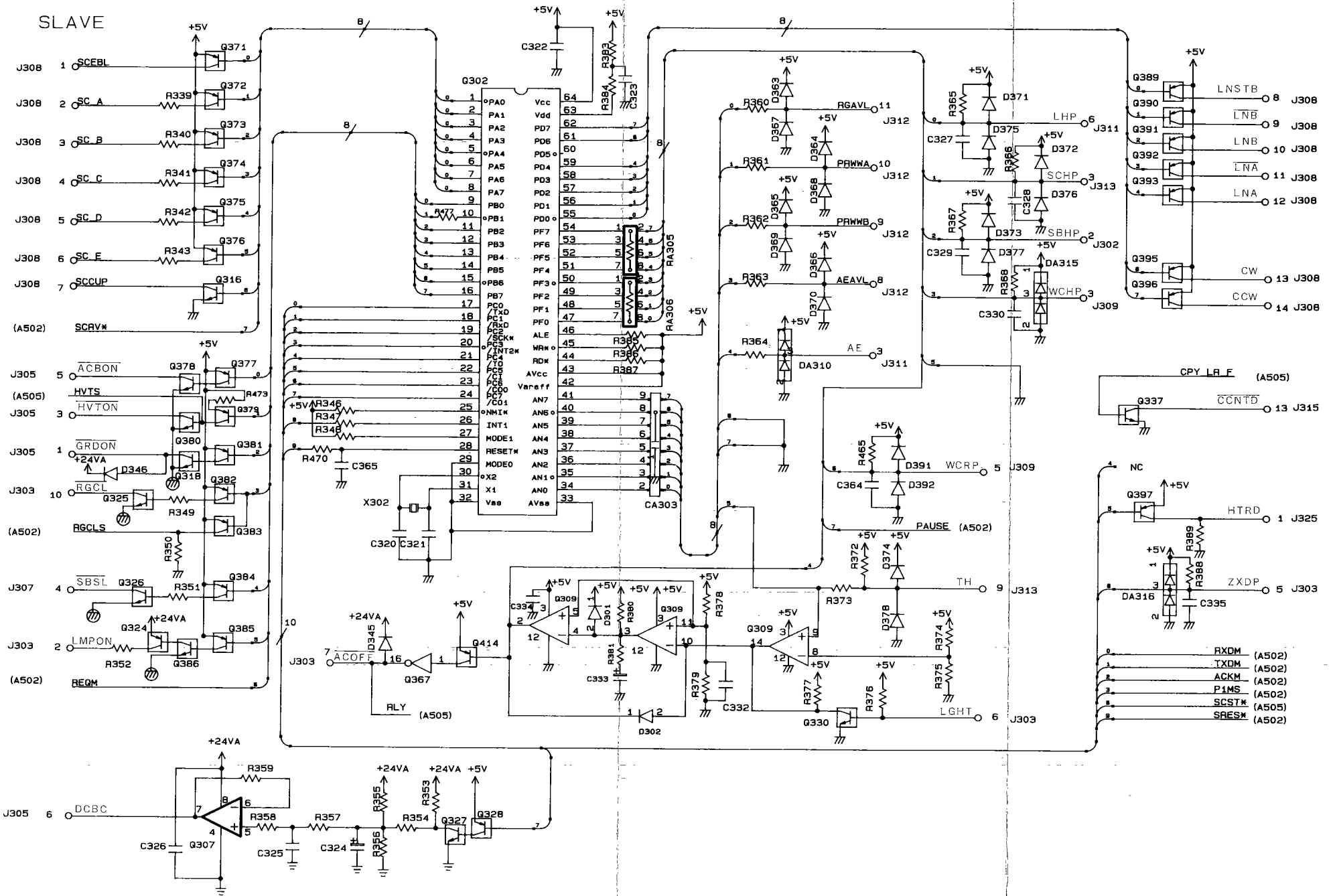

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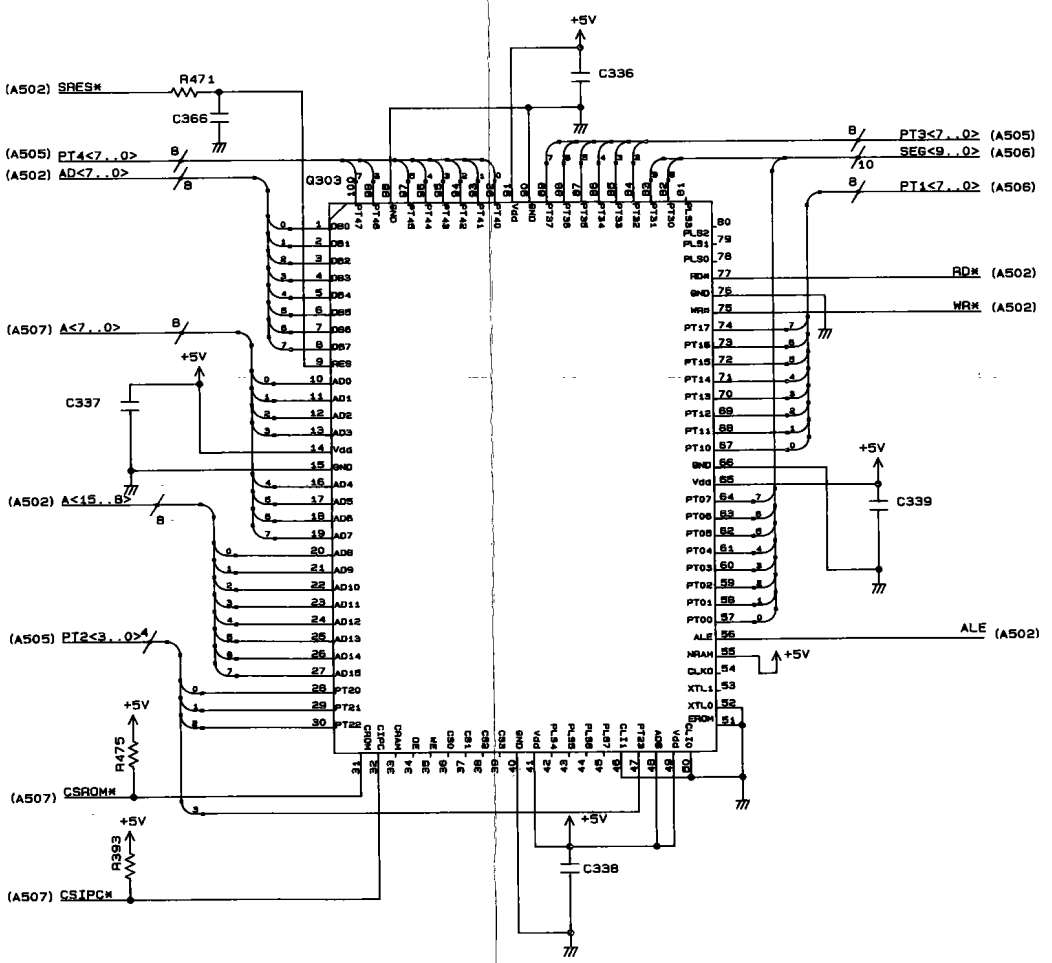
GATE ARRAY



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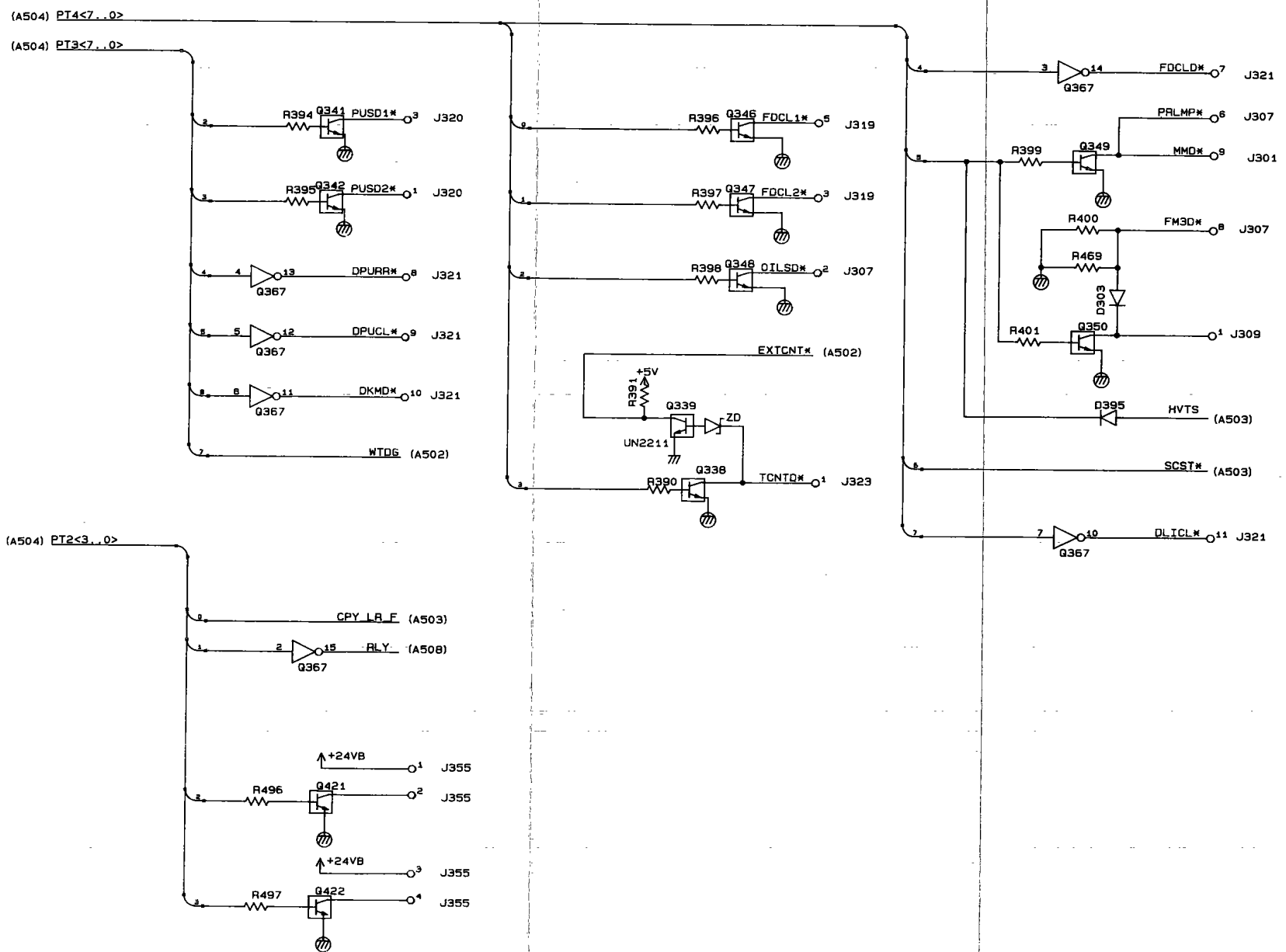
PORT OF GATE ARRAY



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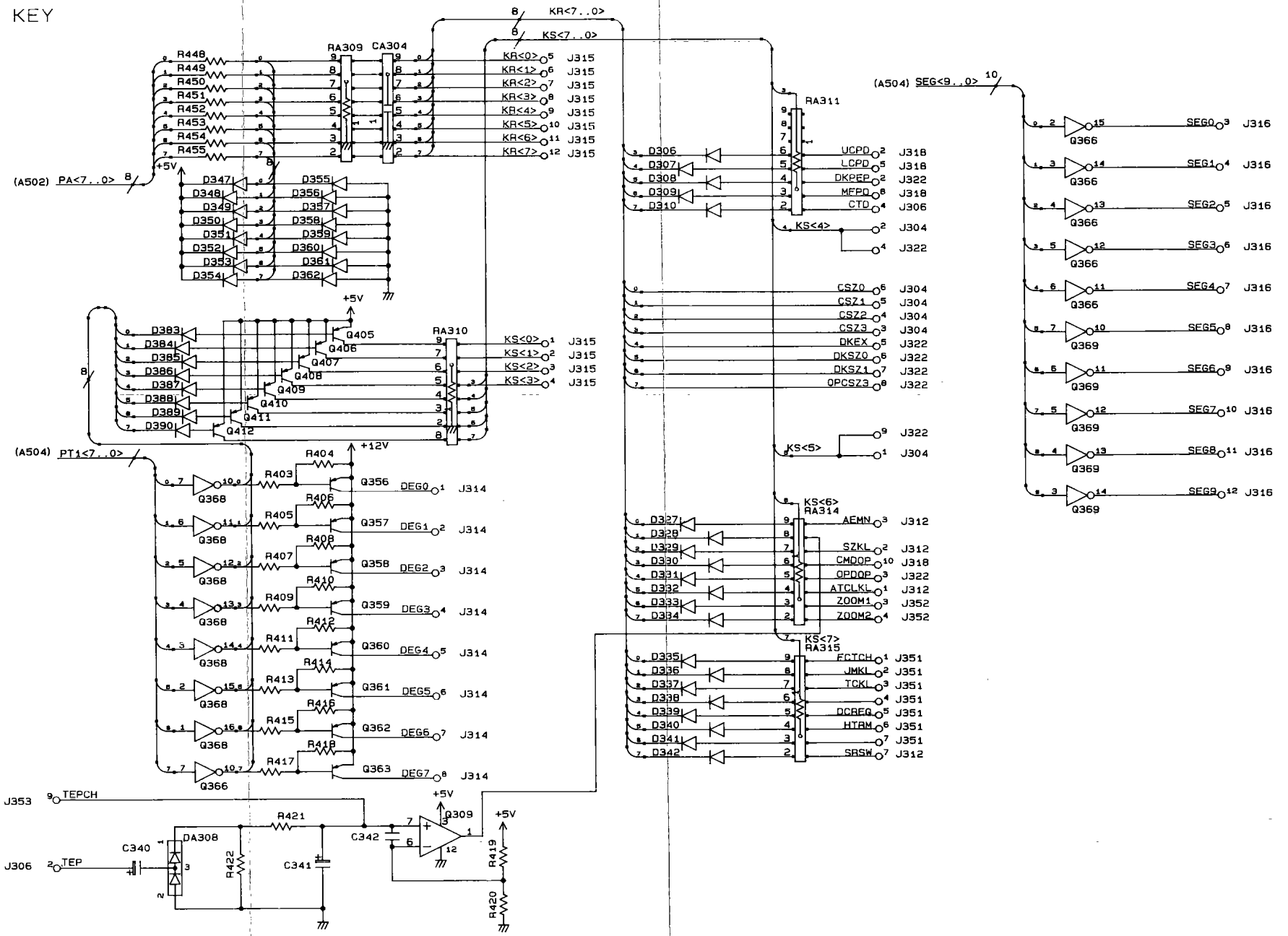

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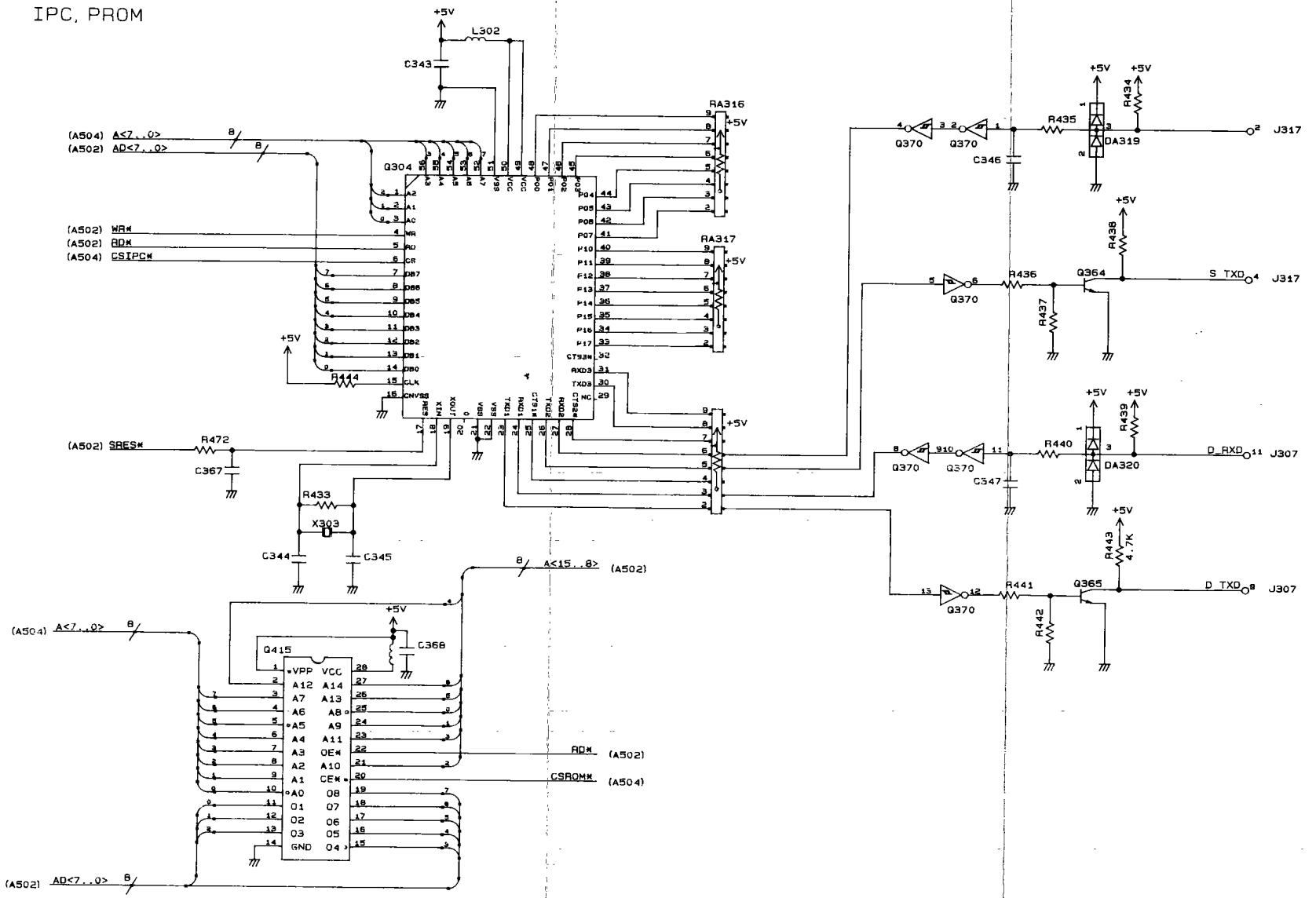
IPC, PROM



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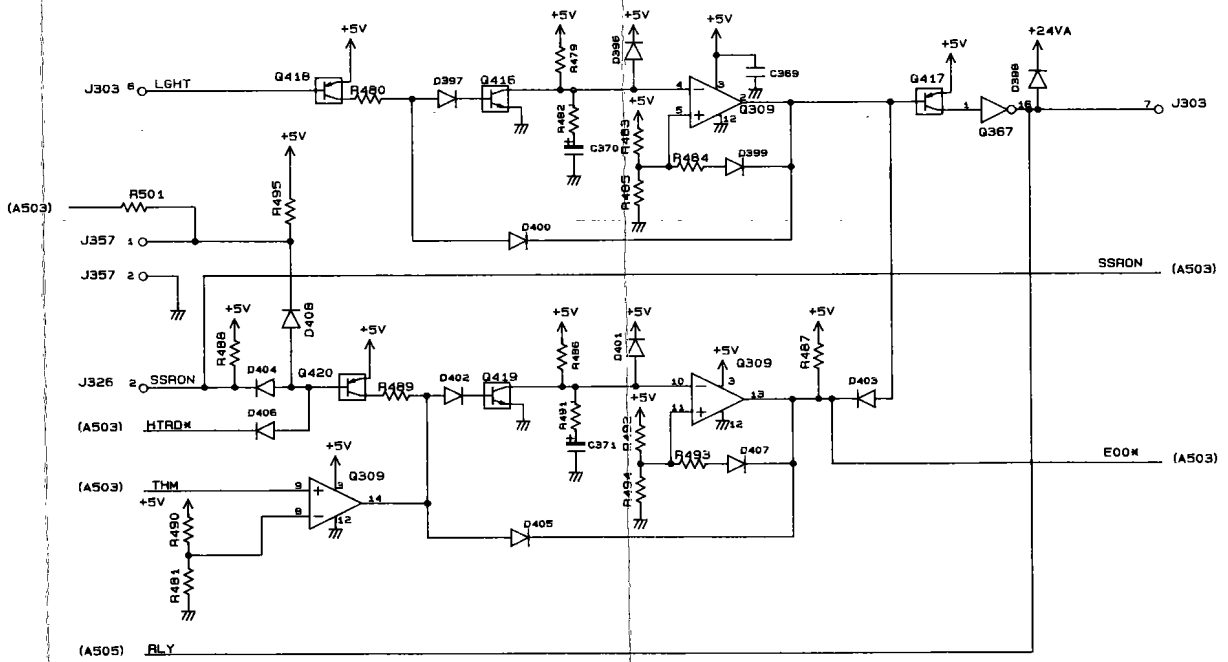

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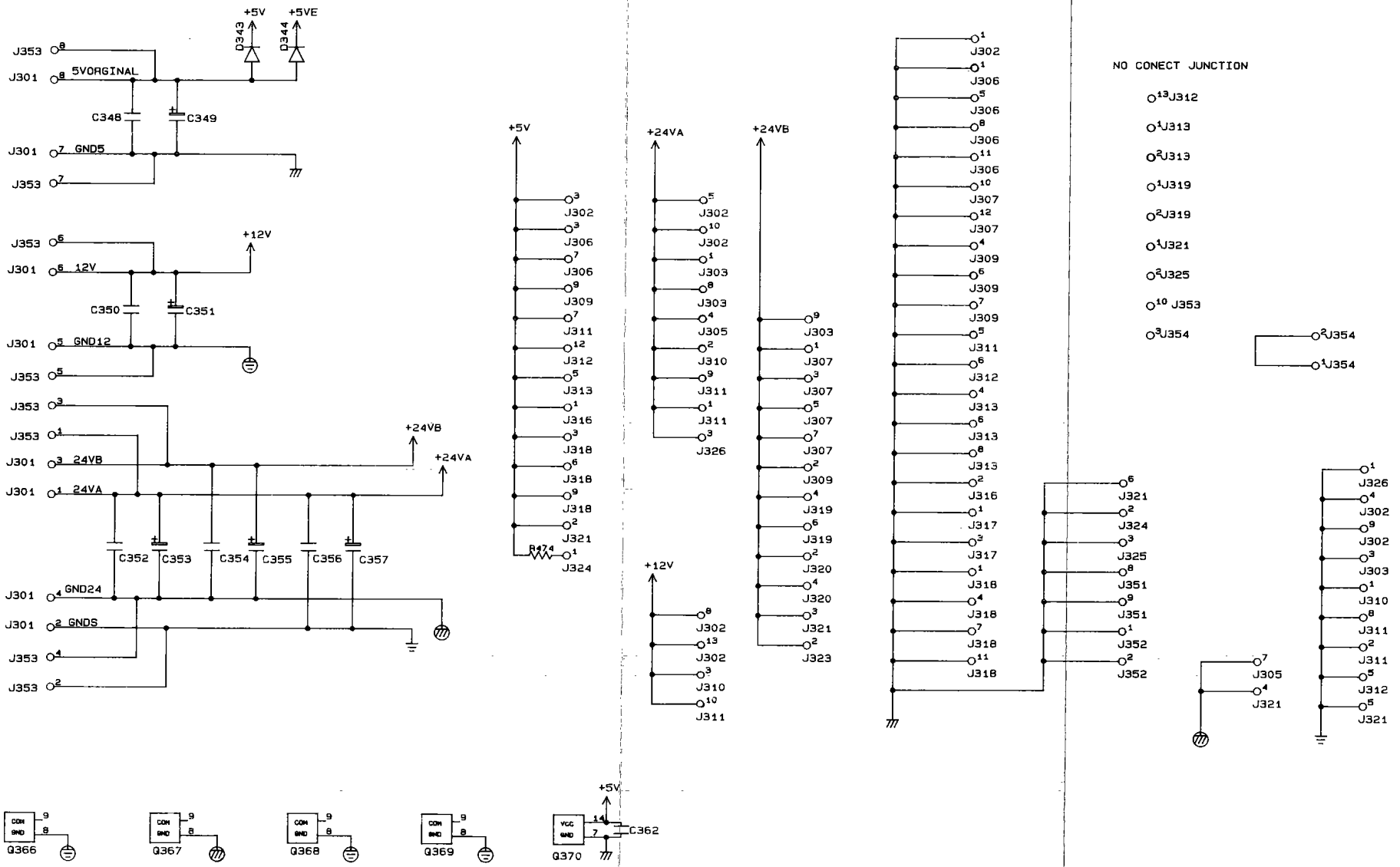
DC CONTROLLER PCB (NP2120/A509)



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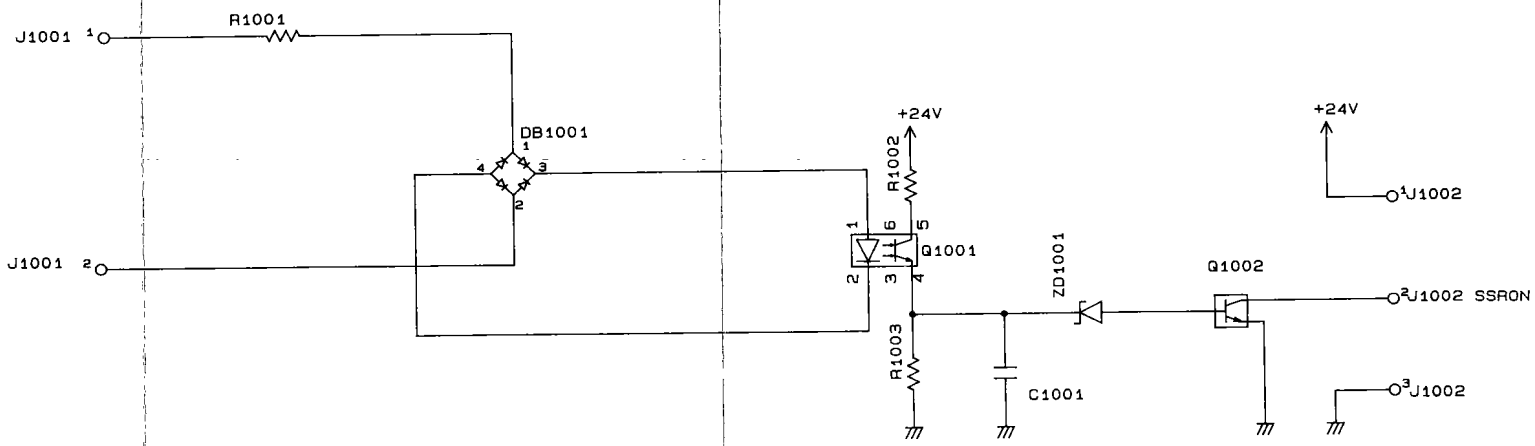
5B. SSR ON DETECTION PCB (NP2120)



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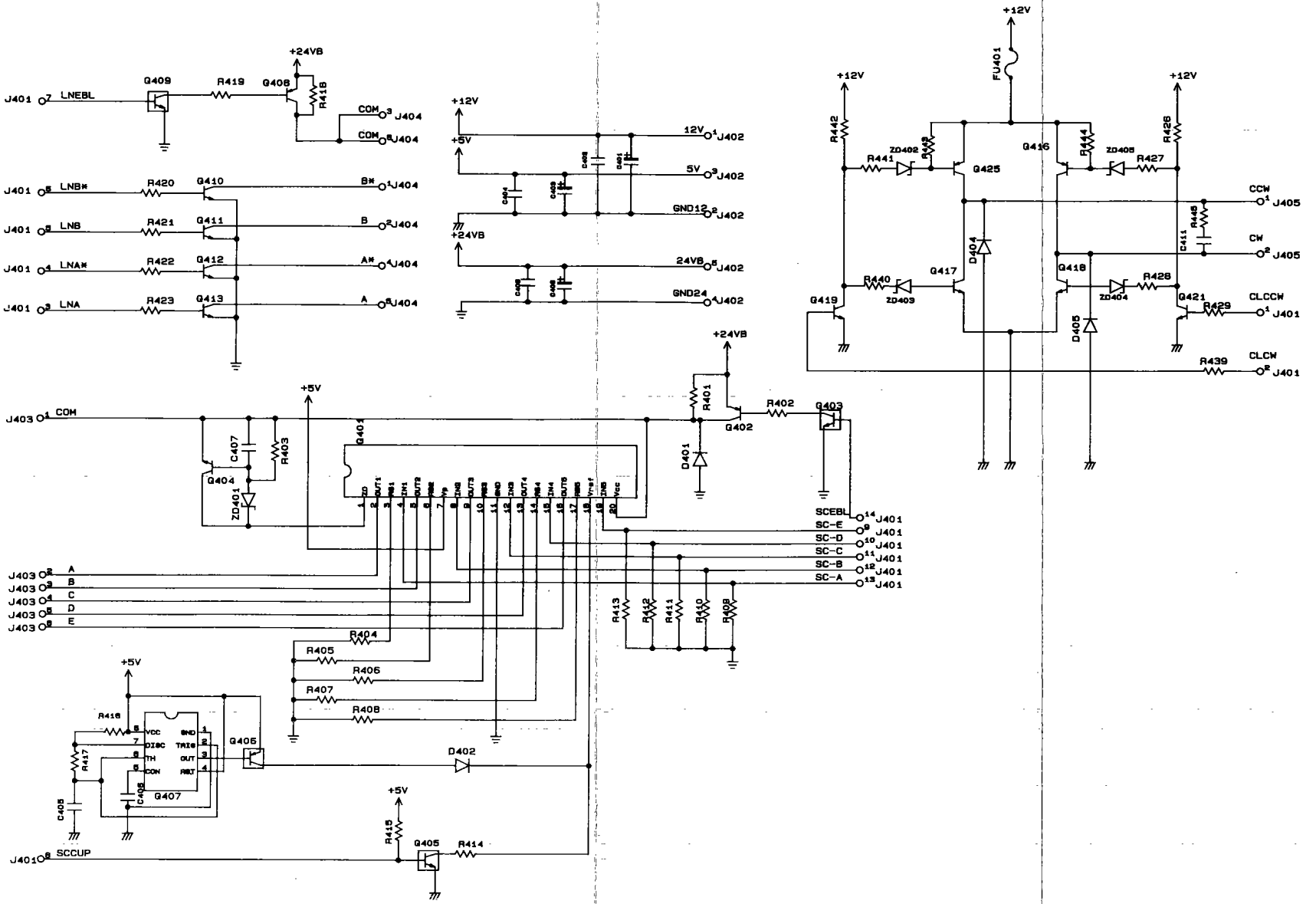

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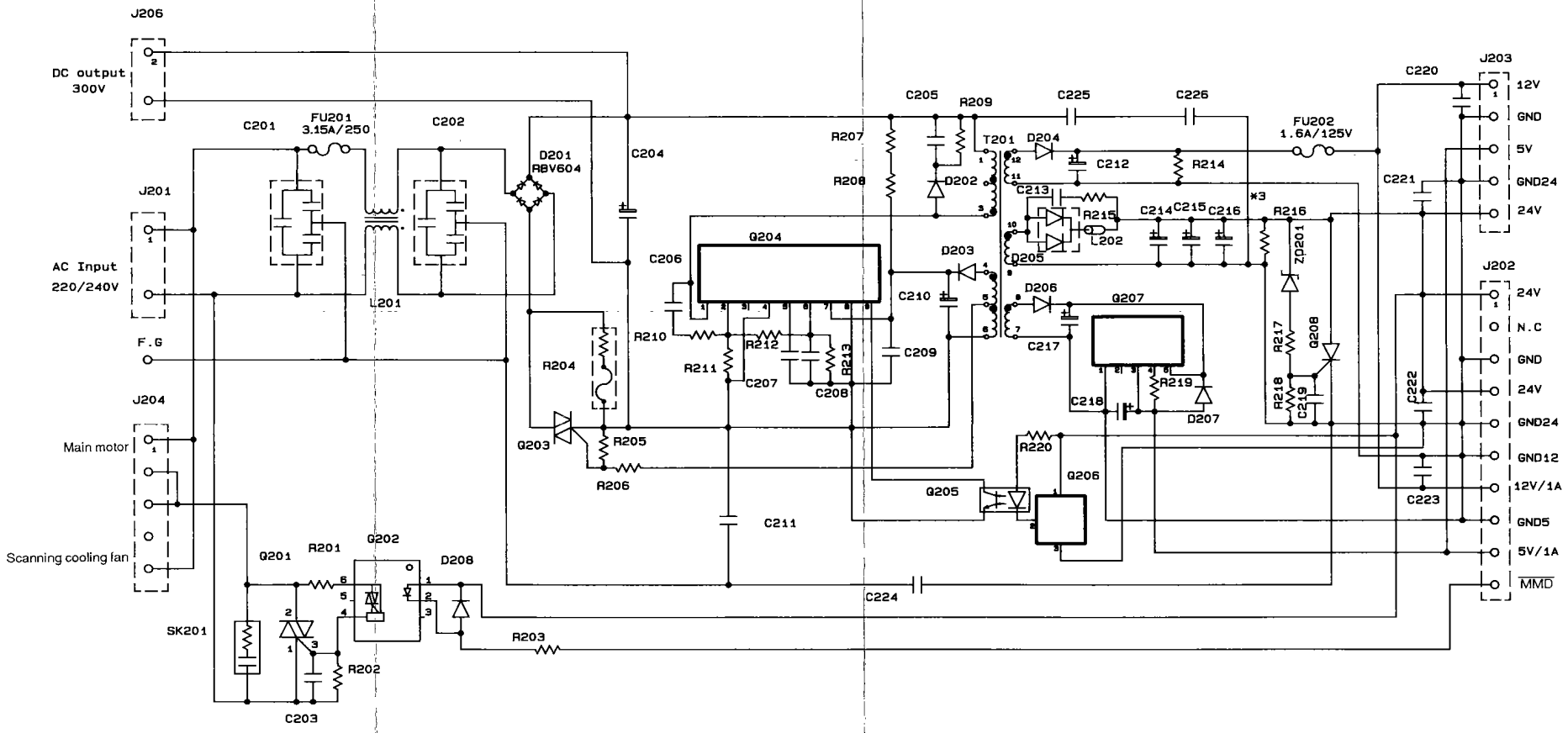
7. DC POWER SUPPLY PCB



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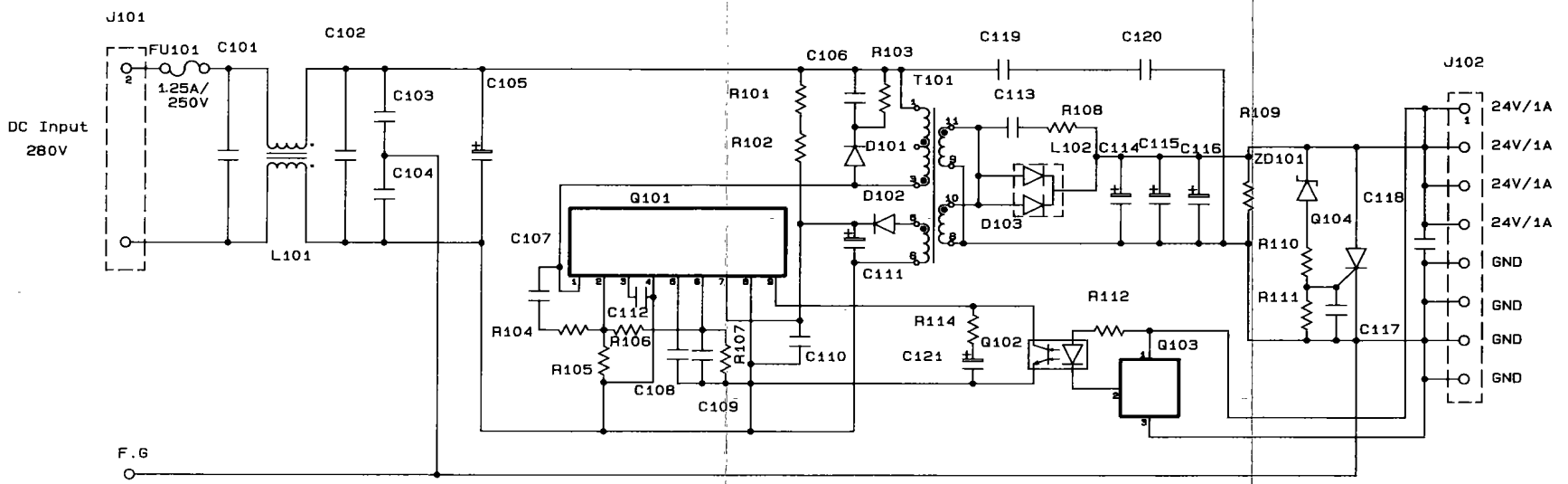

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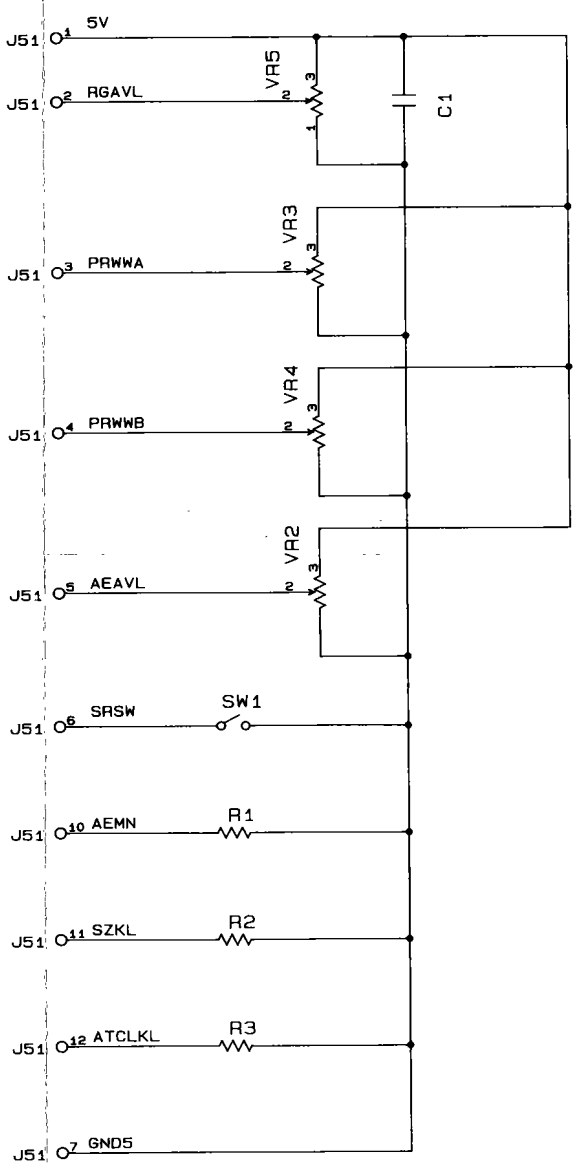
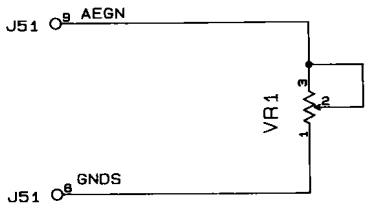
9. ADJUSTING PCB





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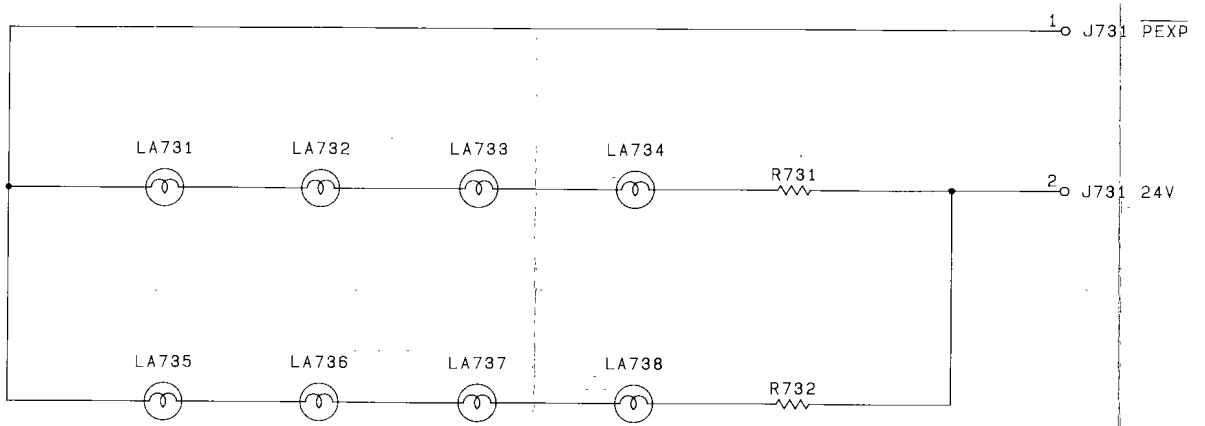
10. PRE-EXPOSURE LAMP



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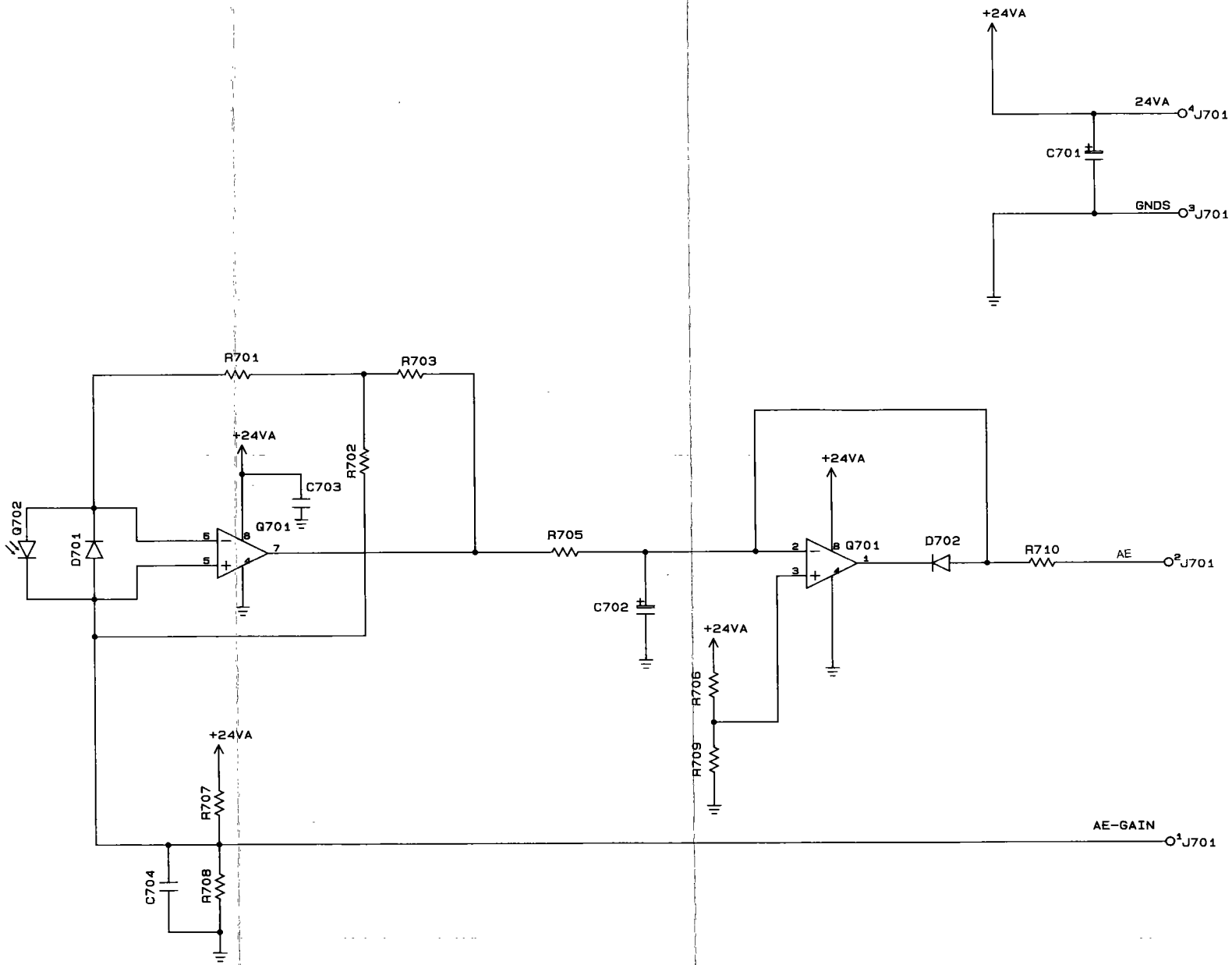
11. AE SENSOR



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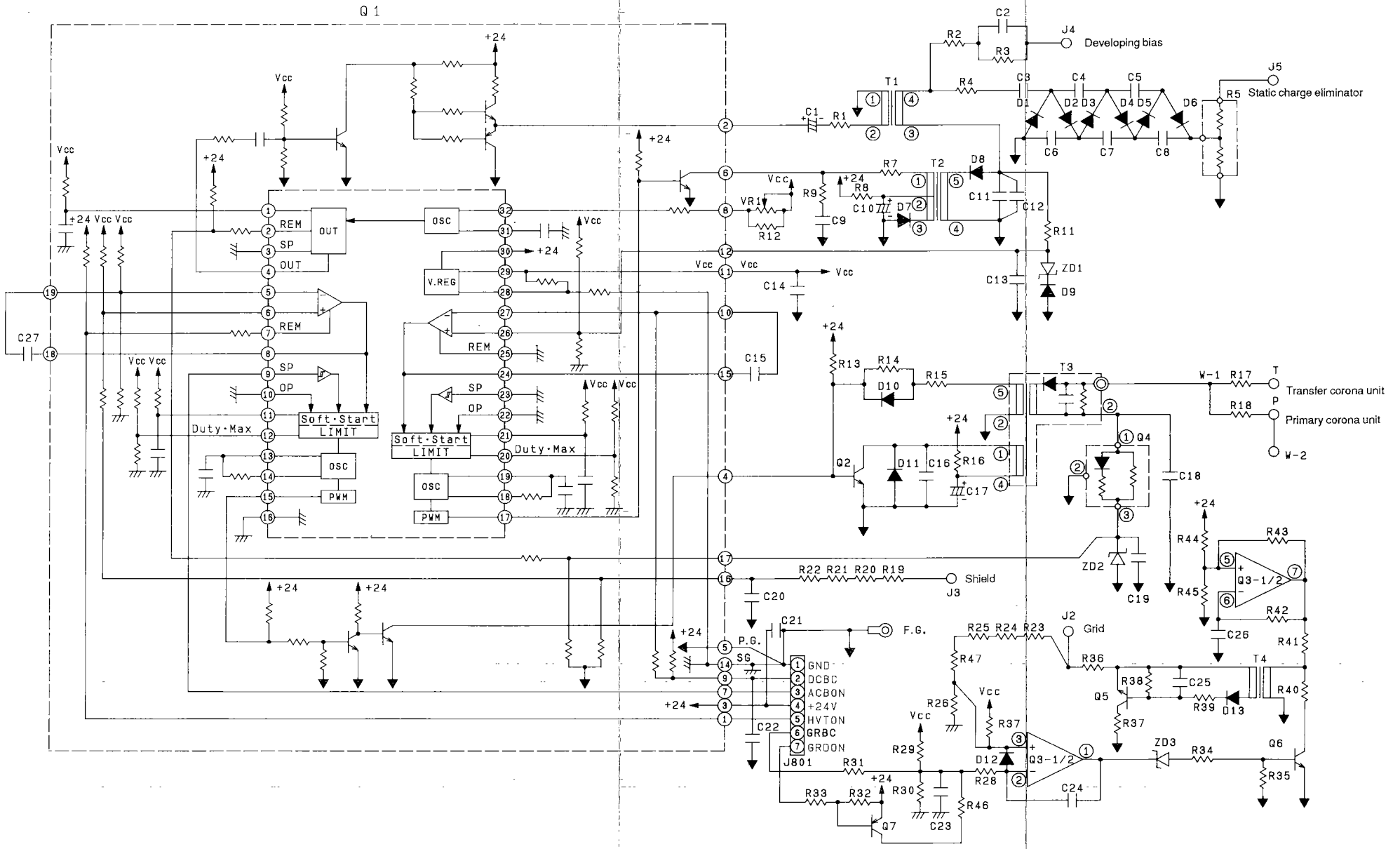

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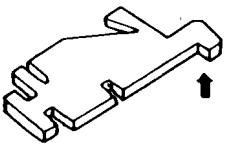
13. LIST OF SPECIAL TOOLS

Special tools which are required for servicing this copying machine (in addition to the standard tool set) are listed below.

No.	Tool name	Tool No.	Shape	Code	Application/Remarks
1	Door switch actuator	TKN-0093		A	
2	Spring scale (compression)	CK-0054		B	• Measuring cassette spring strength • Adjusting scanner drive cable tension
3	Cleaning oil	TKN-0464		A	

Note: Rank
A: Each serviceman should carry one with him.
B: A group of five servicemen should share one.
C: Each workshop should keep one.

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14. LIST OF SOLVENT AND MATERIAL

No.	Name	Use	Chemical formula, mixture ratio, etc.	Source	Remarks
1	Ethyl alcohol (Ethanol) Isopropyl alcohol (Isopropanol)	Cleaning copyboard glass, mirror, etc.	C_2H_5OH $(CH_3)_2CHOH$	Locally	Flammable. Use in a well-ventilated area. Avoid breathing concentrated vapor.
2	MEK	Removing toner or oil stains	$CH_3 \cdot CO \cdot C_2H_5$ Methyletyl ketone	Locally	Flammable. Use in a well-ventilated area. Avoid breathing concentrated vapor. Avoid contact with eyes or skin. Do not use for cleaning the durm, molded plastic parts, or corona wires.
3	Heat-resistant grease	Lubricating the drive mechanisms; e.g., copyboard driving gear, fixing drive gear, fixing ass'y, etc.		CANON	Tool No.: CK-0427 (500g/can) (Equivalent grease can be used, but should be able to withstand 200°C for extended periods of time.)
4	Lubricating oil (low viscosity)	Lubrication points: Scanner rail, etc.		Locally	Tool No.: CK-0451 (100cc) Equivalent oil can be used: ISO VG 68 oil ESSO Febis K68 MOBIL Vactraoil No. 2 SHELL Tonna Oil T68
5	Lubricating oil (low viscosity)	Lubrication point: One-way clutch in pick-up control unit		Locally	Tool No.: CK-0524 (100cc) Equivalent oil can be used: ISO VG 220 oil ESSO Febis K220 MOBIL Vactraoil No. 4

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